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FIELD MANUAL

ARMY EPHEMERIS, 1975

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HEADQUARTERS, DEPARTMENT OF THE ARMY
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FIELD MANUAL

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HEADQUARTERS
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*This manual supersedes TM 6-300, 10 August 1973.



Section I. INTRODUCTION

1. Purpose and Scope

a. This manual is a compilation of tables and charts for use in computing astronomical azimuths for the field artillery. These tables and charts are used for computing azimuth of the sun or selected stars by either the altitude or hour-angle method. A special table (table 12), which is a tabular method of computing Polaris, is included for a rapid computation of a Polaris azimuth. Tables and charts are also included to correct astronomic azimuth to grid azimuth, to extend azimuth by simultaneous observation and to perform zone to zone transformation of azimuth.

b. Data contained in tables 2, 10a, 10b, 11, and 12 are current only for the year in which the manual is effective. These tables are compiled annually by the Target Acquisition Department, US Army Field Artillery School. The basis astronomical data is furnished by the Nautical Almanac Office, US Naval Observatory.

c. Users of this manual are encouraged to submit recommended changes or comments to improve the manual. Comments should be keyed to the specific page, paragraph, and line of the text in which the change is recommended. Reasons should be provided for each comment to insure understanding and complete evaluation. Comments should be prepared using DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forwarded direct to the Commandant, US ARMY Field Artillery School, ATTN: ATSFA-CT-DL, Fort Sill, Oklahoma 73503.

2. Description of Tables and Charts

This manual is intended to be used as a companion publication to FM 6-2, Field Artillery Survey. Details on the computation of astronomical azimuth and the use of these tables and charts are contained in FM 6-2.



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Section II. ASTRONOMICAL TABLES AND CHARTS

Table 1a. Astronomic Refraction Corrected for Temperature (Degrees)

TO BE SUBTRACTED FROM OBSERVED ALTITUDE OF SUN OR STAR

(Use values of observed altitude and temperature nearest the values tabulated as arguments.)

Observed altitude		Temperature °F.																
		-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+110	+120	+130
00	00	40-43	39-45	38-53	38-02	37-15	36-27	35-44	35-01	34-20	33-40	33-01	32-26	31-51	31-36	30-43	30-14	29-46
	20	35-57	35-06	34-20	33-35	32-53	32-11	31-33	30-55	30-18	29-44	29-09	28-38	28-07	27-37	27-07	26-42	26-17
	40	32-00	31-15	30-34	29-54	29-16	28-39	28-05	27-31	26-59	26-28	25-57	25-30	25-02	24-35	24-09	23-46	23-23
01	00	28-42	28-01	27-25	26-49	26-15	25-42	25-12	24-41	24-12	23-44	23-17	22-52	22-27	22-03	21-40	21-19	20-59
	20	25-55	25-19	24-46	24-13	23-43	23-13	22-45	22-18	21-51	21-26	21-02	20-39	20-17	19-55	19-44	19-15	18-57
	40	23-34	23-00	22-31	22-01	21-33	21-06	20-41	20-16	19-52	19-29	19-07	18-46	18-26	18-06	17-47	17-30	17-13
02	00	21-32	21-02	20-35	20-07	19-42	19-17	18-54	18-31	18-10	17-49	17-28	17-10	16-51	16-33	16-15	16-00	15-45
	20	19-48	19-20	18-54	18-29	18-06	17-43	17-22	17-01	16-41	16-22	16-03	15-46	15-29	15-12	14-56	14-42	14-28
	40	18-17	17-51	17-28	17-05	16-43	16-22	16-03	15-43	15-25	15-07	14-50	14-34	14-18	14-02	13-48	13-35	13-22
03	00	16-57	16-33	16-12	15-50	15-30	15-11	14-53	14-35	14-18	14-01	13-45	13-30	13-16	13-01	12-48	12-36	12-24
	20	15-47	15-25	15-05	14-45	14-27	14-08	13-51	13-35	13-19	13-04	12-48	12-35	12-21	12-08	11-55	11-44	11-32
	40	14-45	14-25	14-06	13-47	13-30	13-13	12-57	12-42	12-27	12-12	11-58	11-46	11-33	11-20	11-08	10-58	10-47
04	00	13-50	13-31	13-13	12-56	12-40	12-24	12-09	11-54	11-40	11-27	11-14	11-02	10-50	10-38	10-27	10-17	10-07
	20	13-01	12-43	12-26	12-10	11-55	11-40	11-26	11-12	10-59	10-46	10-34	10-23	10-11	10-00	09-50	09-40	09-31
	40	12-17	12-00	11-44	11-29	11-14	11-00	10-47	10-34	10-22	10-10	09-58	09-47	09-37	09-26	09-16	09-08	08-59
05	00	11-38	11-21	11-07	10-52	10-38	10-25	10-13	10-00	09-48	09-37	09-26	09-16	09-06	08-56	08-47	08-38	08-30
	20	11-02	10-46	10-32	10-18	10-05	09-53	09-41	09-29	09-18	09-07	08-57	08-47	08-38	08-28	08-19	08-12	08-04
	40	10-29	10-14	10-01	09-48	09-35	09-23	09-12	09-01	08-50	08-40	08-30	08-21	08-12	08-03	07-55	07-47	07-40
06	00	09-59	09-45	09-32	09-20	09-08	08-56	08-46	08-35	08-25	08-16	08-06	07-57	07-49	07-40	07-32	07-25	07-18
	20	09-32	09-18	09-06	08-54	08-43	08-32	08-22	08-12	08-02	07-53	07-44	07-35	07-27	07-19	07-11	07-05	06-58
	40	09-07	08-54	08-42	08-31	08-20	08-09	08-00	07-50	07-41	07-32	07-23	07-16	07-08	07-00	06-53	06-46	06-40
07	00	08-43	08-31	08-20	08-09	07-59	07-49	07-39	07-30	07-21	07-13	07-05	06-57	06-50	06-42	06-35	06-29	06-23
	20	08-22	08-10	08-00	07-49	07-39	07-30	07-21	07-12	07-03	06-55	06-47	06-40	06-33	06-26	06-19	06-13	06-07
	40	08-02	07-51	07-41	07-31	07-21	07-12	07-03	06-55	06-47	06-39	06-31	06-24	06-17	06-10	06-04	05-58	05-53
08		07-44	07-33	07-23	07-13	07-04	06-55	06-47	06-39	06-31	06-24	06-16	06-10	06-03	05-56	05-50	05-45	05-39
	20	07-27	07-16	07-07	06-57	06-49	06-40	06-32	06-24	06-17	06-09	06-02	05-56	05-49	05-43	05-37	05-32	05-27
	40	07-11	07-01	06-52	06-42	06-34	06-26	06-18	06-10	06-03	05-56	05-49	05-43	05-37	05-31	05-25	05-20	05-15
09	00	06-56	06-46	06-37	06-28	06-20	06-12	06-05	05-58	05-51	05-44	05-37	05-31	05-25	05-19	05-14	05-09	05-04
	20	06-42	06-32	06-24	06-15	06-08	06-00	05-53	05-46	05-39	05-32	05-26	05-20	05-14	05-08	05-03	04-58	04-54
	40	06-29	06-19	06-11	06-03	05-56	05-48	05-41	05-34	05-28	05-21	05-15	05-10	05-04	04-59	04-53	04-49	04-44
10	00	06-16	06-07	06-00	05-52	05-44	05-37	05-30	05-24	05-17	05-11	05-05	05-00	04-54	04-49	04-44	04-40	04-35
	20	06-05	05-56	05-48	05-41	05-34	05-27	05-20	05-14	05-08	05-02	04-56	04-51	04-45	04-40	04-35	04-31	04-27
	40	05-54	05-45	05-38	05-30	05-24	05-17	05-10	05-04	04-58	04-53	04-47	04-42	04-37	04-32	04-27	04-23	04-19
11	00	05-43	05-35	05-28	05-21	05-14	05-07	05-01	04-55	04-50	04-44	04-39	04-34	04-29	04-24	04-19	04-15	04-11
	20	05-34	05-26	05-19	05-12	05-05	04-59	04-53	04-47	04-41	04-36	04-31	04-26	04-21	04-16	04-12	04-08	04-04
	40	05-24	05-17	05-10	05-03	04-57	04-50	04-45	04-39	04-33	04-28	04-23	04-18	04-14	04-09	04-05	04-01	03-57
12	00	05-15	05-08	05-01	04-55	04-49	04-42	04-37	04-31	04-26	04-21	04-16	04-11	04-07	04-02	03-58	03-54	03-51
	20	05-07	05-00	04-53	04-47	04-41	04-35	04-30	04-24	04-19	04-14	04-09	04-05	04-00	03-56	03-52	03-48	03-44
	40	04-59	04-52	04-46	04-39	04-34	04-28	04-21	04-17	04-12	04-07	04-03	03-58	03-54	03-50	03-46	03-42	03-39

Table 1a. Astronomic Refraction Corrected for Temperature (Degrees)—Continued

Observed altitude	Temperature °F.																
	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+110	+120	+130
13 00	04-51	04-45	04-38	04-32	04-27	04-21	04-16	04-11	04-06	04-01	03-56	03-52	03-48	03-44	03-40	03-36	03-33
20	04-44	04-37	04-31	04-25	04-20	04-14	04-09	04-04	04-00	03-55	03-50	03-46	03-42	03-38	03-34	03-31	03-27
40	04-37	04-31	04-25	04-19	04-14	04-08	04-03	03-58	03-54	03-49	03-45	03-41	03-37	03-33	03-29	03-26	03-23
14 00	04-31	04-24	04-19	04-13	04-08	04-02	03-58	03-53	03-48	03-44	03-40	03-36	03-32	03-28	03-24	03-21	03-19
20	04-24	04-18	04-12	04-07	04-02	03-57	03-52	03-47	03-43	03-39	03-34	03-31	03-27	03-23	03-19	03-16	03-13
40	04-18	04-12	04-07	04-01	03-56	03-51	03-47	03-41	03-38	03-34	03-29	03-26	03-22	03-18	03-15	03-12	03-09
15 00	04-12	04-06	04-01	03-56	03-51	03-46	03-42	03-37	03-33	03-29	03-25	03-21	03-17	03-14	03-10	03-07	03-04
20	04-07	04-01	03-56	03-51	03-46	03-41	03-37	03-32	03-28	03-24	03-20	03-17	03-13	03-10	03-06	03-03	03-00
40	04-01	03-56	03-51	03-46	03-41	03-36	03-32	03-28	03-24	03-20	03-16	03-12	03-09	03-05	03-02	02-59	02-57
16 00	03-56	03-51	03-46	03-41	03-36	03-32	03-27	03-23	03-19	03-15	03-12	03-08	03-05	03-01	02-58	02-55	02-53
20	03-51	03-46	03-41	03-36	03-32	03-27	03-23	03-19	03-15	03-12	03-08	03-04	03-01	02-58	02-55	02-52	02-49
40	03-47	03-41	03-36	03-32	03-27	03-23	03-19	03-15	03-11	03-07	03-04	03-00	02-57	02-54	02-51	02-48	02-46
17 00	03-42	03-37	03-32	03-27	03-23	03-19	03-15	03-11	03-07	03-04	03-00	02-57	02-54	02-51	02-48	02-45	02-42
20	03-38	03-32	03-28	03-23	03-19	03-15	03-11	03-07	03-03	03-00	02-56	02-53	02-50	02-47	02-44	02-42	02-39
40	03-33	03-28	03-24	03-19	03-15	03-11	03-07	03-03	03-00	02-56	02-53	02-50	02-47	02-44	02-41	02-38	02-36
18 00	03-29	03-24	03-20	03-15	03-11	03-07	03-04	03-00	02-56	02-53	02-50	02-47	02-44	02-41	02-38	02-35	02-33
20	03-25	03-20	03-16	03-12	03-08	03-04	03-00	02-56	02-53	02-50	02-46	02-43	02-41	02-38	02-35	02-32	02-30
40	03-21	03-17	03-12	03-08	03-04	03-00	02-57	02-53	02-50	02-46	02-43	02-40	02-37	02-35	02-32	02-30	02-27
19 00	03-18	03-13	03-09	03-05	03-01	02-57	02-53	02-50	02-47	02-43	02-40	02-37	02-35	02-32	02-29	02-27	02-24
20	03-14	03-09	03-05	03-01	02-58	02-54	02-50	02-47	02-44	02-40	02-37	02-35	02-32	02-29	02-26	02-24	02-22
40	03-10	03-06	03-02	02-58	02-54	02-51	02-47	02-44	02-41	02-38	02-34	02-32	02-29	02-26	02-24	02-21	02-19
20 00	03-07	03-03	02-59	02-55	02-51	02-48	02-44	02-41	02-38	02-35	02-32	02-29	02-26	02-24	02-21	02-19	02-17
20	03-04	02-59	02-56	02-52	02-48	02-45	02-41	02-38	02-35	02-32	02-29	02-26	02-24	02-21	02-19	02-17	02-14
40	03-01	02-56	02-53	02-49	02-45	02-42	02-39	02-35	02-32	02-29	02-27	02-24	02-21	02-19	02-16	02-14	02-12
21 00	02-58	02-53	02-50	02-46	02-42	02-39	02-36	02-33	02-30	02-27	02-24	02-21	02-19	02-16	02-14	02-12	02-10
20	02-55	02-50	02-47	02-43	02-40	02-36	02-33	02-30	02-27	02-24	02-22	02-19	02-17	02-14	02-12	02-10	02-08
40	02-52	02-48	02-44	02-40	02-37	02-34	02-31	02-28	02-25	02-22	02-19	02-17	02-14	02-12	02-10	02-07	02-05
22 00	02-49	02-45	02-41	02-38	02-34	02-31	02-28	02-25	02-22	02-20	02-17	02-14	02-12	02-10	02-07	02-05	02-03
20	02-46	02-42	02-39	02-35	02-32	02-29	02-26	02-23	02-20	02-17	02-15	02-12	02-10	02-08	02-05	02-03	02-01
40	02-43	02-40	02-36	02-33	02-30	02-26	02-23	02-21	02-18	02-15	02-13	02-10	02-08	02-06	02-03	02-01	01-59
23 00	02-41	02-37	02-34	02-30	02-27	02-24	02-21	02-18	02-16	02-13	02-10	02-08	02-06	02-04	02-01	01-59	01-58
20	02-38	02-34	02-31	02-28	02-25	02-22	02-19	02-16	02-13	02-11	02-08	02-06	02-04	02-02	01-59	01-58	01-56
40	02-36	02-32	02-29	02-26	02-23	02-20	02-17	02-14	02-11	02-09	02-06	02-04	02-02	02-00	01-58	01-56	01-54
24 00	02-33	02-30	02-26	02-23	02-20	02-17	02-15	02-12	02-09	02-07	02-04	02-02	02-00	01-58	01-56	01-54	01-52
20	02-31	02-28	02-24	02-21	02-18	02-15	02-13	02-10	02-07	02-05	02-03	02-00	01-58	01-56	01-54	01-52	01-50
40	02-29	02-25	02-22	02-19	02-16	02-13	02-11	02-08	02-05	02-03	02-01	01-59	01-56	01-54	01-52	01-50	01-49
25 00	02-26	02-23	02-20	02-17	02-11	02-09	02-06	02-04	02-01	01-59	01-57	01-55	01-53	01-51	01-49	01-47	01-47
20	02-24	02-21	02-18	02-15	02-12	02-09	02-07	02-04	02-02	02-00	01-57	01-55	01-53	01-51	01-49	01-47	01-46
40	02-22	02-19	02-16	02-13	02-10	02-07	02-05	02-02	02-00	01-58	01-55	01-53	01-51	01-49	01-47	01-46	01-44
26 00	02-20	02-17	02-14	02-11	02-08	02-06	02-03	02-01	01-58	01-56	01-54	01-52	01-50	01-48	01-46	01-44	01-42
20	02-18	02-15	02-12	02-09	02-06	02-04	02-01	01-59	01-56	01-54	01-52	01-50	01-48	01-46	01-44	01-43	01-41
40	02-16	02-13	02-10	02-07	02-05	02-02	02-00	01-57	01-55	01-53	01-50	01-48	01-47	01-45	01-43	01-41	01-40

Table 1a. Astronomic Refraction Corrected for Temperature. (Degrees)—Continued

Observed altitude	Temperature °F.																
	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+110	+120	+130
27 00	02-14	02-11	02-08	02-05	02-03	02-00	01-58	01-55	01-53	01-51	01-49	01-47	01-45	01-43	01-41	01-40	01-38
27 20	02-12	02-09	02-06	02-04	02-01	01-59	01-56	01-54	01-52	01-49	01-47	01-45	01-44	01-42	01-40	01-38	01-37
27 40	02-10	02-07	02-05	02-02	01-59	01-57	01-55	01-52	01-50	01-48	01-46	01-44	01-42	01-40	01-38	01-37	01-35
28 00	02-09	02-06	02-03	02-00	01-58	01-55	01-53	01-51	01-48	01-46	01-44	01-43	01-41	01-39	01-37	01-36	01-34
28 20	02-07	02-04	02-01	01-59	01-56	01-54	01-51	01-49	01-47	01-45	01-43	01-41	01-39	01-37	01-36	01-34	01-33
28 40	02-05	02-02	02-00	01-57	01-54	01-52	01-50	01-48	01-46	01-43	01-41	01-40	01-38	01-36	01-34	01-33	01-31
29 00	02-03	02-01	01-58	01-55	01-53	01-51	01-48	01-46	01-44	01-42	01-40	01-38	01-37	01-35	01-33	01-32	01-30
29 20	02-02	01-59	01-56	01-54	01-51	01-49	01-47	01-45	01-43	01-41	01-39	01-37	01-35	01-34	01-32	01-30	01-29
29 40	02-00	01-57	01-55	01-52	01-50	01-48	01-45	01-43	01-41	01-39	01-37	01-36	01-34	01-32	01-31	01-29	01-28
30 00	01-59	01-56	01-53	01-51	01-48	01-46	01-44	01-42	01-40	01-38	01-36	01-34	01-33	01-31	01-30	01-28	01-27
30 20	01-57	01-54	01-52	01-49	01-47	01-45	01-43	01-41	01-39	01-37	01-35	01-33	01-32	01-30	01-28	01-27	01-25
30 40	01-56	01-53	01-50	01-48	01-46	01-43	01-41	01-39	01-37	01-36	01-34	01-32	01-30	01-29	01-27	01-26	01-24
31 00	01-54	01-51	01-49	01-46	01-44	01-42	01-40	01-38	01-36	01-34	01-32	01-31	01-29	01-28	01-26	01-25	01-23
31 20	01-52	01-50	01-47	01-45	01-43	01-41	01-39	01-37	01-35	01-33	01-31	01-30	01-28	01-26	01-25	01-24	01-22
31 40	01-51	01-48	01-46	01-44	01-42	01-39	01-37	01-35	01-34	01-32	01-30	01-28	01-27	01-25	01-24	01-22	01-21
32 00	01-50	01-47	01-45	01-42	01-40	01-38	01-36	01-34	01-32	01-31	01-29	01-27	01-26	01-24	01-23	01-21	01-20
32 30	01-48	01-45	01-43	01-40	01-38	01-36	01-34	01-33	01-31	01-29	01-27	01-26	01-24	01-23	01-21	01-20	01-19
33 00	01-45	01-43	01-41	01-39	01-36	01-34	01-33	01-31	01-29	01-27	01-26	01-24	01-22	01-21	01-20	01-18	01-17
33 30	01-44	01-41	01-39	01-37	01-35	01-33	01-31	01-29	01-27	01-26	01-24	01-22	01-21	01-20	01-18	01-17	01-16
34 00	01-42	01-39	01-37	01-35	01-33	01-31	01-29	01-27	01-26	01-24	01-22	01-21	01-19	01-18	01-17	01-15	01-14
34 30	01-40	01-37	01-35	01-33	01-31	01-29	01-28	01-26	01-24	01-23	01-21	01-19	01-18	01-17	01-15	01-14	01-13
35 00	01-38	01-36	01-33	01-31	01-30	01-28	01-26	01-24	01-22	01-21	01-19	01-18	01-17	01-15	01-14	01-13	01-12
35 30	01-36	01-34	01-32	01-30	01-28	01-26	01-24	01-23	01-21	01-19	01-18	01-17	01-15	01-14	01-12	01-11	01-10
36 00	01-34	01-32	01-30	01-28	01-26	01-24	01-23	01-21	01-20	01-18	01-16	01-15	01-14	01-12	01-11	01-10	01-09
36 30	01-33	01-30	01-28	01-27	01-25	01-23	01-21	01-20	01-18	01-17	01-15	01-14	01-12	01-11	01-10	01-09	01-08
37 00	01-31	01-29	01-27	01-25	01-23	01-21	01-20	01-18	01-17	01-15	01-14	01-12	01-11	01-10	01-09	01-08	01-06
37 30	01-29	01-27	01-25	01-23	01-22	01-20	01-18	01-17	01-15	01-14	01-12	01-11	01-10	01-09	01-07	01-06	01-05
38 00	01-28	01-26	01-24	01-22	01-20	01-19	01-17	01-15	01-14	01-13	01-11	01-10	01-09	01-07	01-06	01-05	01-04
38 30	01-26	01-24	01-22	01-21	01-19	01-17	01-16	01-14	01-13	01-11	01-10	01-09	01-07	01-06	01-05	01-04	01-03
39 00	01-25	01-23	01-21	01-19	01-17	01-16	01-14	01-13	01-11	01-10	01-09	01-07	01-06	01-05	01-04	01-03	01-02
39 30	01-23	01-21	01-19	01-18	01-16	01-14	01-13	01-12	01-10	01-09	01-07	01-06	01-05	01-04	01-03	01-02	01-01
40 00	01-22	01-20	01-18	01-16	01-15	01-13	01-12	01-10	01-09	01-08	01-06	01-05	01-04	01-03	01-02	01-01	01-00
40 30	01-20	01-18	01-17	01-15	01-13	01-12	01-10	01-09	01-08	01-06	01-05	01-04	01-03	01-02	01-01	01-00	00-59
41 00	01-19	01-17	01-15	01-14	01-12	01-11	01-09	01-09	01-06	01-05	01-04	01-03	01-02	01-01	01-00	00-59	00-58
41 30	01-18	01-16	01-14	01-12	01-11	01-09	01-08	01-07	01-05	01-04	01-03	01-02	01-01	01-00	00-59	00-58	00-57
42 00	01-16	01-14	01-13	01-11	01-10	01-08	01-07	01-05	01-04	01-03	01-02	01-01	01-00	00-58	00-57	00-57	00-56
42 30	01-15	01-13	01-11	01-10	01-08	01-07	01-06	01-04	01-03	01-02	01-01	01-00	00-59	00-57	00-56	00-56	00-55
43 00	01-14	01-12	01-10	01-09	01-07	01-06	01-05	01-03	01-02	01-01	01-00	00-59	00-58	00-56	00-55	00-55	00-54
43 30	01-12	01-11	01-09	01-08	01-06	01-05	01-04	01-02	01-01	01-00	00-59	00-58	00-57	00-56	00-55	00-54	00-53

Table 1a. Astronomic Refraction Corrected for Temperature (Degrees)—Continued

Observed altitude	Temperature °F.																
	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+110	+120	+130
•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
44 00	01-11	01-09	01-08	01-06	01-05	01-04	01-02	01-01	01-00	00-59	00-58	00-57	00-56	00-55	00-54	00-53	00-52
30	01-10	01-08	01-07	01-05	01-04	01-03	01-01	01-00	00-59	00-58	00-57	00-56	00-55	00-54	00-53	00-52	00-51
45 00	01-09	01-07	01-06	01-04	01-03	01-01	01-00	00-59	00-58	00-57	00-56	00-55	00-54	00-53	00-52	00-51	00-50
30	01-07	01-06	01-04	01-03	01-02	01-00	00-59	00-58	00-57	00-56	00-55	00-54	00-53	00-52	00-51	00-50	00-49
46 00	01-06	01-05	01-03	01-02	01-01	00-59	00-58	00-57	00-56	00-55	00-54	00-53	00-52	00-51	00-50	00-49	00-48
30	01-05	01-04	01-02	01-01	01-00	00-58	00-57	00-56	00-55	00-54	00-53	00-52	00-51	00-50	00-49	00-48	00-48
47 00	01-04	01-03	01-01	01-00	00-59	00-57	00-56	00-55	00-54	00-53	00-52	00-51	00-50	00-49	00-48	00-48	00-47
30	01-03	01-01	01-00	00-59	00-58	00-56	00-55	00-54	00-53	00-52	00-51	00-50	00-49	00-48	00-47	00-47	00-46
48 00	01-02	01-00	00-59	00-58	00-57	00-55	00-54	00-53	00-52	00-51	00-50	00-49	00-48	00-47	00-47	00-46	00-45
30	01-01	00-59	00-58	00-57	00-56	00-54	00-53	00-52	00-51	00-50	00-49	00-48	00-48	00-47	00-46	00-45	00-44
49 00	01-00	00-58	00-57	00-56	00-55	00-53	00-52	00-51	00-50	00-49	00-48	00-48	00-47	00-46	00-45	00-44	00-44
30	00-59	00-57	00-56	00-55	00-54	00-52	00-51	00-50	00-49	00-48	00-48	00-47	00-46	00-45	00-44	00-44	00-43
50 00	00-58	00-56	00-55	00-54	00-53	00-52	00-51	00-50	00-49	00-48	00-47	00-46	00-45	00-44	00-43	00-43	00-42
51 00	00-56	00-54	00-53	00-52	00-51	00-50	00-49	00-48	00-47	00-46	00-45	00-44	00-44	00-43	00-42	00-41	00-41
52 00	00-54	00-52	00-51	00-50	00-49	00-48	00-47	00-46	00-45	00-44	00-43	00-43	00-42	00-41	00-40	00-40	00-39
53 00	00-52	00-50	00-49	00-48	00-47	00-46	00-45	00-44	00-44	00-43	00-42	00-41	00-40	00-40	00-39	00-38	00-38
54 00	00-50	00-49	00-48	00-47	00-46	00-45	00-44	00-43	00-42	00-41	00-41	00-40	00-39	00-38	00-38	00-37	00-37
55 00	00-48	00-47	00-46	00-45	00-44	00-43	00-42	00-41	00-40	00-40	00-39	00-38	00-38	00-37	00-36	00-36	00-35
56 00	00-46	00-45	00-44	00-43	00-42	00-41	00-41	00-40	00-39	00-38	00-38	00-37	00-36	00-36	00-35	00-34	00-34
57 00	00-45	00-44	00-43	00-42	00-41	00-40	00-39	00-38	00-38	00-37	00-36	00-36	00-35	00-34	00-34	00-33	00-33
58 00	00-43	00-42	00-41	00-40	00-39	00-38	00-38	00-37	00-36	00-36	00-35	00-34	00-34	00-33	00-32	00-32	00-31
59 00	00-41	00-40	00-39	00-39	00-38	00-37	00-36	00-35	00-35	00-34	00-33	00-33	00-32	00-32	00-31	00-31	00-30
60 00	00-40	00-39	00-38	00-37	00-36	00-35	00-35	00-34	00-33	00-33	00-32	00-32	00-31	00-30	00-30	00-29	00-29

Table 1b. Astronomical Refraction Corrected for Temperature (Mils)

TO BE SUBTRACTED FROM OBSERVED ALTITUDE OF SUN OR STAR

(Use values of observed altitude and temperature nearest the values tabulated as arguments.)

Observed altitude	Temperature °F.																
	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+110	+120	+130
0	12.68	12.35	12.05	11.82	11.67	11.53	11.40	11.28	11.16	11.04	10.93	10.82	10.72	10.62	10.52	10.42	10.32
10	9.83	9.60	9.39	9.18	8.99	8.80	8.63	8.45	8.29	8.13	7.97	7.83	7.69	7.55	7.42	7.29	7.16
20	8.18	7.99	7.82	7.64	7.49	7.33	7.21	7.04	6.90	6.77	6.64	6.52	6.40	6.28	6.17	6.05	5.93
30	6.94	6.79	6.63	6.49	6.35	6.23	6.09	5.97	5.85	5.74	5.63	5.53	5.43	5.33	5.24	5.14	5.03
40	5.69	5.55	5.42	5.29	5.18	5.06	4.93	4.81	4.69	4.59	4.47	4.39	4.29	4.20	4.11	4.02	3.93
50	4.44	4.31	4.19	4.08	3.98	3.88	3.78	3.69	3.60	3.51	3.42	3.33	3.24	3.15	3.07	2.98	2.89
60	3.19	3.07	2.96	2.86	2.77	2.68	2.59	2.50	2.41	2.33	2.24	2.15	2.07	1.98	1.90	1.81	1.72
70	1.94	1.83	1.73	1.64	1.55	1.46	1.37	1.29	1.20	1.12	1.03	0.95	0.87	0.79	0.71	0.62	0.54
80	1.69	1.59	1.50	1.41	1.32	1.23	1.15	1.06	0.98	0.89	0.81	0.73	0.65	0.57	0.49	0.41	0.32
90	1.44	1.35	1.26	1.17	1.08	1.00	0.91	0.83	0.75	0.66	0.58	0.50	0.42	0.34	0.26	0.18	0.10
100	1.19	1.10	1.01	0.92	0.83	0.75	0.66	0.58	0.50	0.42	0.34	0.26	0.18	0.10	0.02	-0.06	-0.14
110	0.94	0.85	0.76	0.67	0.58	0.50	0.42	0.34	0.26	0.18	0.10	0.02	-0.06	-0.14	-0.22	-0.30	-0.38
120	0.69	0.60	0.51	0.42	0.33	0.25	0.16	0.08	0.00	-0.08	-0.16	-0.24	-0.32	-0.40	-0.48	-0.56	-0.64
130	0.44	0.35	0.26	0.17	0.08	0.00	-0.08	-0.16	-0.24	-0.32	-0.40	-0.48	-0.56	-0.64	-0.72	-0.80	-0.88
140	0.19	0.10	0.01	-0.08	-0.16	-0.24	-0.32	-0.40	-0.48	-0.56	-0.64	-0.72	-0.80	-0.88	-0.96	-1.04	-1.12
150	-0.06	-0.15	-0.24	-0.32	-0.40	-0.48	-0.56	-0.64	-0.72	-0.80	-0.88	-0.96	-1.04	-1.12	-1.20	-1.28	-1.36
160	-0.31	-0.40	-0.48	-0.56	-0.64	-0.72	-0.80	-0.88	-0.96	-1.04	-1.12	-1.20	-1.28	-1.36	-1.44	-1.52	-1.60
170	-0.56	-0.64	-0.72	-0.80	-0.88	-0.96	-1.04	-1.12	-1.20	-1.28	-1.36	-1.44	-1.52	-1.60	-1.68	-1.76	-1.84
180	-0.81	-0.88	-0.96	-1.04	-1.12	-1.20	-1.28	-1.36	-1.44	-1.52	-1.60	-1.68	-1.76	-1.84	-1.92	-2.00	-2.08
190	-1.06	-1.13	-1.20	-1.28	-1.36	-1.44	-1.52	-1.60	-1.68	-1.76	-1.84	-1.92	-2.00	-2.08	-2.16	-2.24	-2.32
200	-1.31	-1.38	-1.44	-1.52	-1.60	-1.68	-1.76	-1.84	-1.92	-2.00	-2.08	-2.16	-2.24	-2.32	-2.40	-2.48	-2.56
210	-1.56	-1.63	-1.69	-1.76	-1.84	-1.92	-2.00	-2.08	-2.16	-2.24	-2.32	-2.40	-2.48	-2.56	-2.64	-2.72	-2.80
220	-1.81	-1.87	-1.93	-2.00	-2.08	-2.16	-2.24	-2.32	-2.40	-2.48	-2.56	-2.64	-2.72	-2.80	-2.88	-2.96	-3.04
230	-2.06	-2.12	-2.18	-2.24	-2.32	-2.40	-2.48	-2.56	-2.64	-2.72	-2.80	-2.88	-2.96	-3.04	-3.12	-3.20	-3.28
240	-2.31	-2.36	-2.42	-2.48	-2.56	-2.64	-2.72	-2.80	-2.88	-2.96	-3.04	-3.12	-3.20	-3.28	-3.36	-3.44	-3.52
250	-2.56	-2.61	-2.67	-2.72	-2.80	-2.88	-2.96	-3.04	-3.12	-3.20	-3.28	-3.36	-3.44	-3.52	-3.60	-3.68	-3.76
260	-2.81	-2.85	-2.90	-2.96	-3.04	-3.12	-3.20	-3.28	-3.36	-3.44	-3.52	-3.60	-3.68	-3.76	-3.84	-3.92	-4.00
270	-3.06	-3.10	-3.15	-3.20	-3.28	-3.36	-3.44	-3.52	-3.60	-3.68	-3.76	-3.84	-3.92	-4.00	-4.08	-4.16	-4.24
280	-3.31	-3.34	-3.38	-3.44	-3.52	-3.60	-3.68	-3.76	-3.84	-3.92	-4.00	-4.08	-4.16	-4.24	-4.32	-4.40	-4.48
290	-3.56	-3.58	-3.62	-3.68	-3.76	-3.84	-3.92	-4.00	-4.08	-4.16	-4.24	-4.32	-4.40	-4.48	-4.56	-4.64	-4.72
300	-3.81	-3.83	-3.86	-3.92	-4.00	-4.08	-4.16	-4.24	-4.32	-4.40	-4.48	-4.56	-4.64	-4.72	-4.80	-4.88	-4.96
310	-4.06	-4.07	-4.10	-4.16	-4.24	-4.32	-4.40	-4.48	-4.56	-4.64	-4.72	-4.80	-4.88	-4.96	-5.04	-5.12	-5.20
320	-4.31	-4.32	-4.34	-4.40	-4.48	-4.56	-4.64	-4.72	-4.80	-4.88	-4.96	-5.04	-5.12	-5.20	-5.28	-5.36	-5.44
330	-4.56	-4.56	-4.58	-4.64	-4.72	-4.80	-4.88	-4.96	-5.04	-5.12	-5.20	-5.28	-5.36	-5.44	-5.52	-5.60	-5.68
340	-4.81	-4.81	-4.82	-4.88	-4.96	-5.04	-5.12	-5.20	-5.28	-5.36	-5.44	-5.52	-5.60	-5.68	-5.76	-5.84	-5.92

Table 1b. Astronomic Refraction Corrected for Temperature (Mils)—Continued

Observed altitude	Temperature °F.																
	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+110	+120	+130
350	0.94	0.92	0.90	0.88	0.86	0.84	0.82	0.81	0.79	0.78	0.76	0.75	0.74	0.72	0.71	0.70	0.69
360	0.91	0.89	0.87	0.85	0.83	0.82	0.80	0.78	0.77	0.75	0.74	0.73	0.71	0.70	0.69	0.68	0.67
370	0.89	0.86	0.85	0.83	0.81	0.79	0.78	0.76	0.75	0.73	0.72	0.71	0.69	0.68	0.67	0.66	0.65
380	0.86	0.84	0.82	0.80	0.79	0.77	0.76	0.74	0.73	0.71	0.70	0.69	0.67	0.66	0.65	0.64	0.63
390	0.84	0.82	0.80	0.78	0.77	0.75	0.73	0.72	0.71	0.69	0.68	0.67	0.65	0.64	0.63	0.62	0.61
400	0.81	0.79	0.78	0.76	0.74	0.73	0.71	0.70	0.69	0.67	0.66	0.65	0.64	0.62	0.61	0.60	0.59
410	0.79	0.77	0.76	0.74	0.72	0.71	0.70	0.68	0.67	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58
420	0.77	0.75	0.74	0.72	0.71	0.69	0.68	0.66	0.65	0.64	0.63	0.61	0.60	0.59	0.58	0.57	0.56
430	0.75	0.73	0.72	0.70	0.69	0.67	0.66	0.65	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55
440	0.73	0.71	0.70	0.68	0.67	0.66	0.64	0.63	0.62	0.61	0.59	0.58	0.57	0.56	0.55	0.54	0.54
450	0.71	0.70	0.68	0.67	0.65	0.64	0.63	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52
460	0.70	0.68	0.66	0.65	0.64	0.62	0.61	0.60	0.59	0.58	0.56	0.55	0.54	0.53	0.53	0.52	0.51
470	0.68	0.66	0.65	0.64	0.62	0.61	0.60	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.50
480	0.66	0.65	0.63	0.62	0.61	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48
490	0.65	0.63	0.62	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.52	0.52	0.51	0.50	0.49	0.48	0.47
500	0.63	0.62	0.60	0.59	0.58	0.57	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.49	0.48	0.47	0.46
510	0.62	0.62	0.59	0.58	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.47	0.46	0.45
520	0.60	0.59	0.58	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.46	0.45	0.44
530	0.59	0.58	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.45	0.44	0.43
540	0.58	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.43	0.42
550	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.42	0.41
560	0.55	0.54	0.53	0.52	0.50	0.49	0.48	0.47	0.47	0.46	0.45	0.44	0.43	0.42	0.42	0.41	0.40
570	0.54	0.53	0.52	0.50	0.49	0.48	0.47	0.46	0.46	0.45	0.44	0.43	0.42	0.41	0.41	0.40	0.39
580	0.53	0.52	0.50	0.49	0.48	0.47	0.46	0.45	0.45	0.44	0.43	0.42	0.41	0.41	0.40	0.39	0.39
590	0.52	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.44	0.43	0.42	0.41	0.40	0.40	0.39	0.38	0.38
600	0.51	0.49	0.48	0.47	0.46	0.45	0.44	0.44	0.43	0.42	0.41	0.40	0.40	0.39	0.38	0.38	0.37
610	0.50	0.48	0.47	0.46	0.45	0.44	0.44	0.43	0.42	0.41	0.40	0.40	0.39	0.38	0.37	0.37	0.36
620	0.49	0.47	0.46	0.45	0.44	0.43	0.43	0.42	0.41	0.40	0.39	0.39	0.38	0.37	0.37	0.36	0.35
630	0.48	0.46	0.45	0.44	0.44	0.43	0.42	0.41	0.40	0.39	0.39	0.38	0.37	0.37	0.36	0.35	0.35
640	0.47	0.45	0.44	0.43	0.43	0.42	0.41	0.40	0.39	0.39	0.38	0.37	0.36	0.36	0.35	0.35	0.34
650	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.38	0.37	0.36	0.36	0.35	0.34	0.34	0.33
660	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.38	0.37	0.36	0.36	0.35	0.34	0.34	0.33	0.33
670	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.38	0.37	0.36	0.36	0.35	0.34	0.34	0.33	0.33	0.32
680	0.43	0.42	0.41	0.40	0.39	0.39	0.38	0.37	0.36	0.36	0.35	0.34	0.34	0.33	0.32	0.32	0.31
690	0.42	0.41	0.40	0.39	0.39	0.38	0.37	0.36	0.36	0.35	0.34	0.34	0.33	0.32	0.32	0.31	0.31
700	0.41	0.40	0.39	0.39	0.38	0.37	0.36	0.36	0.35	0.34	0.33	0.33	0.32	0.32	0.31	0.31	0.30
710	0.40	0.40	0.39	0.38	0.37	0.36	0.36	0.35	0.34	0.33	0.33	0.32	0.32	0.31	0.31	0.30	0.30
720	0.40	0.39	0.38	0.37	0.36	0.36	0.35	0.34	0.33	0.33	0.32	0.32	0.31	0.30	0.30	0.29	0.29
730	0.39	0.38	0.37	0.36	0.36	0.35	0.34	0.33	0.33	0.32	0.31	0.31	0.30	0.30	0.29	0.29	0.28
740	0.38	0.37	0.36	0.36	0.35	0.34	0.33	0.33	0.32	0.32	0.31	0.30	0.30	0.29	0.29	0.28	0.28
750	0.37	0.36	0.36	0.35	0.34	0.33	0.33	0.32	0.32	0.31	0.30	0.30	0.29	0.29	0.28	0.28	0.27

Table 1b. Astronomic Refraction Corrected for Temperature (Mils)—Continued

Observed altitude	Temperature °F.																
	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+110	+120	+130
760	0.37	0.36	0.35	0.34	0.34	0.33	0.32	0.32	0.31	0.30	0.30	0.29	0.29	0.28	0.28	0.27	0.27
770	0.36	0.35	0.34	0.34	0.33	0.32	0.32	0.31	0.30	0.30	0.29	0.29	0.28	0.28	0.27	0.27	0.26
780	0.35	0.34	0.34	0.33	0.32	0.32	0.31	0.30	0.30	0.29	0.29	0.28	0.28	0.27	0.27	0.26	0.26
790	0.35	0.34	0.33	0.32	0.32	0.31	0.30	0.30	0.29	0.29	0.28	0.28	0.27	0.27	0.26	0.26	0.25
800	0.34	0.33	0.32	0.32	0.31	0.30	0.30	0.29	0.29	0.28	0.28	0.27	0.27	0.26	0.26	0.25	0.25
810	0.33	0.32	0.32	0.31	0.30	0.30	0.29	0.29	0.28	0.27	0.27	0.26	0.26	0.26	0.25	0.25	0.24
820	0.33	0.32	0.31	0.30	0.30	0.29	0.29	0.28	0.27	0.27	0.26	0.26	0.25	0.25	0.25	0.24	0.24
830	0.32	0.31	0.31	0.30	0.29	0.29	0.28	0.28	0.27	0.26	0.26	0.25	0.25	0.25	0.24	0.24	0.23
840	0.31	0.31	0.30	0.29	0.29	0.28	0.27	0.27	0.26	0.26	0.25	0.25	0.24	0.24	0.24	0.23	0.23
850	0.31	0.30	0.29	0.29	0.28	0.27	0.27	0.26	0.26	0.25	0.25	0.24	0.24	0.24	0.23	0.23	0.22
860	0.30	0.29	0.29	0.28	0.28	0.27	0.26	0.26	0.25	0.25	0.24	0.24	0.24	0.23	0.23	0.22	0.22
870	0.30	0.29	0.28	0.28	0.27	0.26	0.26	0.25	0.25	0.24	0.24	0.24	0.23	0.23	0.22	0.22	0.22
880	0.29	0.28	0.28	0.27	0.26	0.25	0.25	0.25	0.24	0.24	0.23	0.23	0.23	0.22	0.22	0.21	0.21
890	0.28	0.28	0.27	0.27	0.26	0.25	0.25	0.24	0.24	0.23	0.23	0.23	0.22	0.22	0.21	0.21	0.21
900	0.28	0.27	0.27	0.26	0.25	0.25	0.24	0.24	0.23	0.23	0.23	0.22	0.22	0.21	0.21	0.21	0.20
910	0.27	0.27	0.26	0.25	0.25	0.24	0.24	0.23	0.23	0.23	0.22	0.22	0.21	0.21	0.21	0.20	0.20
920	0.27	0.26	0.26	0.25	0.24	0.24	0.23	0.23	0.23	0.22	0.22	0.21	0.21	0.21	0.20	0.20	0.20
930	0.26	0.26	0.25	0.24	0.24	0.23	0.23	0.23	0.22	0.22	0.21	0.21	0.20	0.20	0.20	0.19	0.19
940	0.26	0.25	0.25	0.24	0.24	0.23	0.23	0.22	0.22	0.21	0.21	0.20	0.20	0.20	0.19	0.19	0.19
950	0.25	0.25	0.24	0.23	0.23	0.22	0.22	0.22	0.21	0.21	0.20	0.20	0.20	0.19	0.19	0.19	0.18
960	0.25	0.24	0.24	0.23	0.23	0.22	0.22	0.21	0.21	0.20	0.20	0.20	0.19	0.19	0.19	0.18	0.18
970	0.24	0.24	0.23	0.23	0.22	0.22	0.21	0.21	0.20	0.20	0.20	0.19	0.19	0.19	0.18	0.18	0.18
980	0.24	0.23	0.23	0.22	0.22	0.21	0.21	0.20	0.20	0.20	0.19	0.19	0.19	0.18	0.18	0.18	0.17
990	0.23	0.23	0.22	0.22	0.21	0.21	0.20	0.20	0.20	0.19	0.19	0.18	0.18	0.18	0.17	0.17	0.17
1000	0.23	0.22	0.22	0.21	0.21	0.20	0.20	0.19	0.19	0.19	0.18	0.18	0.18	0.17	0.17	0.17	0.17
1010	0.22	0.22	0.21	0.21	0.20	0.20	0.19	0.19	0.19	0.18	0.18	0.18	0.17	0.17	0.17	0.16	0.16
1020	0.22	0.21	0.21	0.20	0.20	0.19	0.19	0.19	0.18	0.18	0.18	0.17	0.17	0.17	0.16	0.16	0.16
1030	0.21	0.21	0.20	0.20	0.19	0.19	0.19	0.18	0.18	0.18	0.17	0.17	0.17	0.16	0.16	0.16	0.16
1040	0.21	0.20	0.20	0.19	0.19	0.19	0.18	0.18	0.18	0.17	0.17	0.17	0.16	0.16	0.16	0.15	0.15
1050	0.20	0.20	0.19	0.19	0.19	0.18	0.18	0.17	0.17	0.17	0.16	0.16	0.16	0.15	0.15	0.15	0.15
1060	0.20	0.19	0.19	0.19	0.18	0.18	0.17	0.17	0.17	0.16	0.16	0.16	0.15	0.15	0.15	0.15	0.15
1070	0.19	0.19	0.19	0.18	0.18	0.17	0.17	0.17	0.16	0.16	0.16	0.15	0.15	0.15	0.15	0.14	0.14
1080	0.19	0.19	0.18	0.18	0.17	0.17	0.17	0.16	0.16	0.16	0.15	0.15	0.15	0.15	0.14	0.14	0.14
1090	0.19	0.18	0.18	0.17	0.17	0.17	0.16	0.16	0.16	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.14
1100	0.18	0.18	0.17	0.17	0.17	0.16	0.16	0.16	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.13	0.13
1110	0.18	0.17	0.17	0.17	0.16	0.16	0.16	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.13	0.13	0.13
1120	0.17	0.17	0.17	0.16	0.16	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.13
1130	0.17	0.16	0.16	0.16	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.13	0.12
1140	0.16	0.16	0.16	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.12	0.12	0.12
1150	0.16	0.16	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.12	0.12	0.12	0.12
1160	0.16	0.15	0.15	0.15	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.12	0.12	0.12	0.12	0.12	0.11
1170	0.15	0.15	0.15	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.12	0.12	0.12	0.12	0.11	0.11	0.11
1180	0.15	0.15	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.12	0.12	0.12	0.12	0.11	0.11	0.11	0.11
1190	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.12	0.12	0.12	0.12	0.12	0.11	0.11	0.11	0.11	0.11
1200	0.14	0.14	0.13	0.13	0.13	0.13	0.12	0.12	0.12	0.12	0.11	0.11	0.11	0.11	0.11	0.10	0.10

Table 1c. Pressure Correction Factor, C_B
 Apply to values in tables 1a or 1b

Barometer		C_B	Barometer		C_B	Barometer		C_B
Inches	Millibars		Inches	Millibars		Inches	Millibars	
20.0	677	0.670	23.8	806	0.796	27.4	928	0.916
20.1	681	0.673	23.9	809	0.799	27.5	931	0.920
20.2	684	0.676				27.6	935	0.923
20.3	687	0.679	23.9	809	0.799	27.7	938	0.926
20.4	691	0.682	24.0	813	0.803	27.8	941	0.929
			24.1	816	0.806			
20.5	694	0.685	24.2	820	0.809	27.8	941	0.929
20.6	698	0.688	24.3	823	0.813	27.9	945	0.933
20.7	701	0.692				28.0	948	0.936
20.8	704	0.696	24.4	826	0.816	28.1	952	0.939
20.9	708	0.699	24.5	830	0.820	28.2	955	0.942
			24.6	833	0.823			
21.0	711	0.703	24.7	836	0.826	28.3	958	0.946
21.1	715	0.706	24.8	840	0.829	28.4	962	0.949
21.2	718	0.709				28.5	965	0.953
21.3	721	0.712	24.9	843	0.832	28.6	969	0.956
21.4	725	0.716	25.0	847	0.835	28.7	972	0.959
			25.1	850	0.838			
21.5	728	0.719	25.2	853	0.842	28.8	975	0.963
21.6	731	0.722	25.3	857	0.846	28.9	979	0.966
21.7	735	0.725				29.0	982	0.970
21.8	738	0.729	25.4	860	0.849	29.1	985	0.973
21.9	742	0.732	25.5	864	0.853	29.2	989	0.976
			25.6	867	0.856			
22.0	745	0.735	25.7	870	0.859	29.3	992	0.979
22.1	748	0.739	25.8	874	0.862	29.4	996	0.983
22.2	752	0.742				29.5	999	0.986
22.3	755	0.746	25.9	877	0.866	29.6	1002	0.989
22.4	759	0.749	26.0	880	0.869	29.7	1006	0.992
			26.1	884	0.872			
22.5	762	0.752	26.2	887	0.875	29.8	1009	0.996
22.6	765	0.755	26.3	891	0.879	29.9	1013	0.999
22.7	769	0.759				30.0	1016	1.003
22.8	772	0.762	26.4	894	0.882	30.1	1019	1.007
22.9	775	0.766	26.5	897	0.885	30.2	1023	1.010
			26.6	901	0.889			
23.0	779	0.770	26.7	904	0.892	30.3	1026	1.013
23.1	782	0.773	26.8	908	0.896	30.4	1029	1.016
23.2	786	0.776				30.5	1033	1.020
23.3	789	0.779	26.9	911	0.899	30.6	1036	1.023
23.4	792	0.783	27.0	914	0.902	30.7	1040	1.026
			27.1	918	0.905			
23.5	796	0.786	27.2	921	0.909	30.8	1043	1.029
23.6	799	0.789	27.3	924	0.912	30.9	1046	1.033
23.7	803	0.792				31.0	1050	1.036

Note. Omit Pressure Correction Factor for artillery surveys of fourth-order (1:3000) or lesser accuracies.

Table 2. Sun, 1975 for Zero Hours Universal Time (GMT)

Greenwich date	Apparent declination				Equation of time			Sidereal time		
	Degrees		Mils		Min	Sec	Daily change (sec)	Hr	Min	Sec
	°	' "	Mils	Daily change (mils)						
JAN 0 TU	-23	8 31	- 411.41	+ 1.28	- 2	39.0	- 28.6	6	36	9.6
1 WE	-23	4 11	- 410.13	+ 1.42	- 3	7.7	- 28.4	6	40	6.2
2 TH	-22	59 24	- 408.71	+ 1.56	- 3	36.0	- 28.0	6	44	2.7
3 FR	-22	54 9	- 407.15	+ 1.69	- 4	4.1	- 27.7	6	47	59.3
4 SA	-22	48 26	- 405.46	+ 1.82	- 4	31.8	- 27.3	6	51	55.8
5 SU	-22	42 17	- 403.64	+ 1.96	- 4	59.1	- 27.0	6	55	52.4
6 MO	-22	35 40	- 401.68	+ 2.09	- 5	26.1	- 26.5	6	59	49.0
7 TU	-22	28 37	- 399.59	+ 2.23	- 5	52.6	- 26.1	7	3	45.5
8 WE	-22	21 6	- 397.36	+ 2.35	- 6	18.7	- 25.6	7	7	42.1
9 TH	-22	13 10	- 395.01	+ 2.48	- 6	44.3	- 25.1	7	11	38.6
10 FR	-22	4 47	- 392.53	+ 2.61	- 7	9.4	- 24.5	7	15	35.2
11 SA	-21	55 58	- 389.92	+ 2.74	- 7	34.0	- 24.0	7	19	31.8
12 SU	-21	46 44	- 387.18	+ 2.87	- 7	58.0	- 23.4	7	23	28.3
13 MO	-21	37 4	- 384.31	+ 2.98	- 8	21.4	- 22.8	7	27	24.9
14 TU	-21	26 59	- 381.33	+ 3.11	- 8	44.2	- 22.1	7	31	21.4
15 WE	-21	16 29	- 378.27	+ 3.23	- 9	6.3	- 21.5	7	35	18.0
16 TH	-21	5 35	- 374.99	+ 3.35	- 9	27.8	- 20.8	7	39	14.5
17 FR	-20	54 17	- 371.64	+ 3.47	- 9	48.6	- 20.1	7	43	11.1
18 SA	-20	42 34	- 368.17	+ 3.58	-10	8.7	- 19.4	7	47	7.6
19 SU	-20	30 29	- 364.59	+ 3.70	-10	28.1	- 18.6	7	51	4.2
20 MO	-20	18 0	- 360.89	+ 3.81	-10	46.7	- 17.9	7	55	0.7
21 TU	-20	5 8	- 357.08	+ 3.93	-11	4.6	- 17.1	7	58	57.3
22 WE	-19	51 54	- 353.15	+ 4.03	-11	21.7	- 16.3	8	2	53.9
23 TH	-19	38 17	- 349.12	+ 4.14	-11	38.0	- 15.5	8	6	50.4
24 FR	-19	24 19	- 344.98	+ 4.24	-11	53.5	- 14.7	8	10	47.0
25 SA	-19	9 59	- 340.74	+ 4.35	-12	8.2	- 13.9	8	14	43.5
26 SU	-18	55 18	- 336.39	+ 4.45	-12	22.1	- 13.1	8	18	40.1
27 MO	-18	40 17	- 331.94	+ 4.56	-12	35.3	- 12.3	8	22	36.7
28 TU	-18	24 55	- 327.38	+ 4.65	-12	47.6	- 11.5	8	26	33.2
29 WE	-18	9 13	- 322.73	+ 4.74	-12	59.1	- 10.7	8	30	29.8
30 TH	-17	53 12	- 317.99	+ 4.85	-13	9.8	- 9.9	8	34	26.3
31 FR	-17	36 51	- 313.14	+ 4.93	-13	19.7	- 9.1	8	38	22.9

Table 2. Sun, 1975 for Zero Hours Universal Time (GMT) — Continued

Greenwich date	Apparent declination				Equation of time			Sidereal time		
	Degrees		Mils		Min	Sec	Daily change (sec)	Hr	Min	Sec
	°	' "	Daily change (sec)	Mils						
FEB 1 SA	-17	20 12		- 308.21	-13	28.8		8	42	19.4
2 SU	-17	3 14	+1018	- 303.18	-13	37.1	- 8.3	8	46	16.0
3 MO	-16	45 58	+1036	- 298.06	-13	44.6	- 7.5	8	50	12.5
4 TU	-16	28 24	+1054	- 292.86	-13	51.3	- 6.7	8	54	9.1
5 WE	-16	10 33	+1071	- 287.57	-13	57.2	- 5.9	8	58	5.7
6 TH	-15	52 25	+1088	- 282.20	-14	2.3	- 5.1	9	2	2.2
7 FR	-15	34 1	+1104	- 276.74	-14	6.6	- 4.3	9	5	58.8
8 SA	-15	15 20	+1121	- 271.21	-14	10.2	- 3.5	9	9	55.3
9 SU	-14	56 25	+1135	- 265.60	-14	12.9	- 2.8	9	13	51.9
10 MO	-14	37 14	+1151	- 259.92	-14	14.9	- 2.0	9	17	48.4
11 TU	-14	17 48	+1166	- 254.16	-14	16.1	- 1.2	9	21	45.0
12 WE	-13	58 8	+1180	- 248.34	-14	16.5	- 0.4	9	25	41.5
13 TH	-13	38 14	+1194	- 242.44	-14	16.1	+ 0.3	9	29	38.1
14 FR	-13	18 7	+1207	- 236.48	-14	15.0	+ 1.1	9	33	34.6
15 SA	-12	57 47	+1220	- 230.46	-14	13.1	+ 1.9	9	37	31.2
16 SU	-12	37 15	+1232	- 224.37	-14	10.5	+ 2.6	9	41	27.7
17 MO	-12	16 30	+1245	- 218.22	-14	7.2	+ 3.4	9	45	24.3
18 TU	-11	55 34	+1256	- 212.02	-14	3.1	+ 4.1	9	49	20.8
19 WE	-11	34 26	+1268	- 205.76	-13	58.3	+ 4.8	9	53	17.4
20 TH	-11	13 8	+1278	- 199.44	-13	52.8	+ 5.5	9	57	14.0
21 FR	-10	51 39	+1289	- 193.08	-13	46.6	+ 6.2	10	1	10.5
22 SA	-10	30 0	+1299	- 186.66	-13	39.8	+ 6.8	10	5	7.1
23 SU	-10	8 11	+1309	- 180.20	-13	32.3	+ 7.5	10	9	3.6
24 MO	- 9	46 13	+1318	- 173.70	-13	24.1	+ 8.1	10	13	0.2
25 TU	- 9	24 7	+1326	- 167.14	-13	15.4	+ 8.8	10	16	56.8
26 WE	- 9	1 52	+1335	- 160.55	-13	6.0	+ 9.4	10	20	53.3
27 TH	- 8	39 29	+1343	- 153.92	-12	56.1	+ 9.9	10	24	49.8
28 FR	- 8	16 58	+1351	- 147.25	-12	45.6	+ 10.5	10	28	46.4
			+1359	+ 6.71			+ 11.0			

Table 2. Sun, 1975 for Zero Hours Universal Time (GMT) — Continued

Greenwich date	Apparent declination				Equation of time			Sidereal time		
	Degrees		Mils		Min	Sec	Daily change (sec)	Hr	Min	Sec
	°	' "	Mils	Daily change (mils)						
MAR 1 SA	- 7	54 19	- 140.54	+ 6.74	-12	34.5	+ 11.5	10	32	42.9
2 SU	- 7	31 34	- 133.80	+ 6.78	-12	23.0	+ 12.0	10	36	39.5
3 MO	- 7	8 42	- 127.02	+ 6.80	-12	11.0	+ 12.5	10	40	36.0
4 TU	- 6	45 44	- 120.22	+ 6.84	-11	58.5	+ 12.9	10	44	32.6
5 WE	- 6	22 40	- 113.38	+ 6.86	-11	45.6	+ 13.4	10	48	29.2
6 TH	- 5	59 31	- 106.52	+ 6.88	-11	32.2	+ 13.8	10	52	25.7
7 FR	- 5	36 17	- 99.64	+ 6.91	-11	18.4	+ 14.2	10	56	22.3
8 SA	- 5	12 58	- 92.73	+ 6.93	-11	4.2	+ 14.6	11	0	18.8
9 SU	- 4	49 35	- 85.80	+ 6.95	-10	49.7	+ 14.9	11	4	15.4
10 MO	- 4	26 8	- 78.85	+ 6.96	-10	34.7	+ 15.3	11	8	11.9
11 TU	- 4	2 37	- 71.89	+ 6.98	-10	19.5	+ 15.6	11	12	8.5
12 WE	- 3	39 4	- 64.91	+ 6.99	-10	3.9	+ 15.9	11	16	5.0
13 TH	- 3	15 28	- 57.92	+ 7.01	- 9	48.0	+ 16.2	11	20	1.6
14 FR	- 2	51 50	- 50.91	+ 7.01	- 9	31.8	+ 16.5	11	23	58.1
15 SA	- 2	28 10	- 43.90	+ 7.02	- 9	15.3	+ 16.7	11	27	54.7
16 SU	- 2	4 28	- 36.88	+ 7.02	- 8	58.6	+ 16.9	11	31	51.2
17 MO	- 1	40 46	- 29.86	+ 7.03	- 8	41.7	+ 17.2	11	35	47.8
18 TU	- 1	17 3	- 22.83	+ 7.03	- 8	24.5	+ 17.4	11	39	44.3
19 WE	- 0	53 19	- 15.80	+ 7.03	- 8	7.1	+ 17.6	11	43	40.9
20 TH	- 0	29 36	- 8.77	+ 7.03	- 7	49.6	+ 17.7	11	47	37.4
21 FR	- 0	5 53	- 1.74	+ 7.02	- 7	31.8	+ 17.9	11	51	34.0
22 SA	+ 0	17 49	+ 5.28	+ 7.02	- 7	13.9	+ 18.0	11	55	30.6
23 SU	+ 0	41 30	+ 12.30	+ 7.01	- 6	55.9	+ 18.1	11	59	27.1
24 MO	+ 1	5 10	+ 19.31	+ 7.00	- 6	37.8	+ 18.2	12	3	23.7
25 TU	+ 1	28 47	+ 26.31	+ 6.99	- 6	19.6	+ 18.3	12	7	20.2
26 WE	+ 1	52 22	+ 33.30	+ 6.97	- 6	1.4	+ 18.3	12	11	16.8
27 TH	+ 2	15 55	+ 40.27	+ 6.97	- 5	43.1	+ 18.3	12	15	13.3
28 FR	+ 2	39 25	+ 47.24	+ 6.94	- 5	24.8	+ 18.3	12	19	9.9
29 SA	+ 3	2 52	+ 54.18	+ 6.93	- 5	6.5	+ 18.2	12	23	6.4
30 SU	+ 3	26 15	+ 61.11	+ 6.91	- 4	48.3	+ 18.2	12	27	3.0
31 MO	+ 3	49 35	+ 68.02	+ 6.89	- 4	30.1	+ 18.1	12	30	59.5

Table 2. Sun, 1975 for Zero Hours Universal Time (GMT) — Continued

Greenwich date	Apparent declination				Equation of time			Sidereal time		
	Degrees		Mils		Min	Sec	Daily change (sec)	Hr	Min	Sec
	°	' "	Mils	Daily change (mils)						
APR 1 TU	+ 4	12 50	+ 74.91	+ 6.87	- 4	12.0	+ 18.0	12	34	56.1
2 WE	+ 4	36 1	+ 81.78	+ 6.85	- 3	54.0	+ 17.9	12	38	52.6
3 TH	+ 4	59 7	+ 88.63	+ 6.81	- 3	36.1	+ 17.7	12	42	49.2
4 FR	+ 5	22 8	+ 95.44	+ 6.80	- 3	18.4	+ 17.5	12	46	45.7
5 SA	+ 5	45 3	+ 102.24	+ 6.76	- 3	0.9	+ 17.4	12	50	42.3
6 SU	+ 6	7 52	+ 109.00	+ 6.73	- 2	43.5	+ 17.2	12	54	38.9
7 MO	+ 6	30 35	+ 115.73	+ 6.69	- 2	26.4	+ 16.9	12	58	35.4
8 TU	+ 6	53 11	+ 122.42	+ 6.67	- 2	9.4	+ 16.7	13	2	32.0
9 WE	+ 7	15 40	+ 129.09	+ 6.62	- 1	52.7	+ 16.5	13	6	28.5
10 TH	+ 7	38 2	+ 135.71	+ 6.59	- 1	36.3	+ 16.2	13	10	25.0
11 FR	+ 8	0 16	+ 142.30	+ 6.55	- 1	20.0	+ 15.9	13	14	21.6
12 SA	+ 8	22 22	+ 148.85	+ 6.51	- 1	4.1	+ 15.6	13	18	18.1
13 SU	+ 8	44 20	+ 155.36	+ 6.46	- 0	48.5	+ 15.3	13	22	14.7
14 MO	+ 9	6 9	+ 161.82	+ 6.42	- 0	33.2	+ 15.0	13	26	11.2
15 TU	+ 9	27 48	+ 168.24	+ 6.37	- 0	18.2	+ 14.7	13	30	7.8
16 WE	+ 9	49 19	+ 174.61	+ 6.32	- 0	3.5	+ 14.3	13	34	4.4
17 TH	+ 10	10 39	+ 180.93	+ 6.28	+ 0	10.8	+ 14.0	13	38	0.9
18 FR	+ 10	31 49	+ 187.21	+ 6.22	+ 0	24.8	+ 13.6	13	41	57.5
19 SA	+ 10	52 49	+ 193.43	+ 6.16	+ 0	38.4	+ 13.2	13	45	54.0
20 SU	+ 11	13 38	+ 199.59	+ 6.12	+ 0	51.7	+ 12.8	13	49	50.6
21 MO	+ 11	34 16	+ 205.71	+ 6.05	+ 1	4.5	+ 12.5	13	53	47.1
22 TU	+ 11	54 42	+ 211.76	+ 6.00	+ 1	17.0	+ 12.0	13	57	43.7
23 WE	+ 12	14 56	+ 217.76	+ 5.94	+ 1	29.0	+ 11.6	14	1	40.2
24 TH	+ 12	34 59	+ 223.70	+ 5.87	+ 1	40.6	+ 11.1	14	5	36.8
25 FR	+ 12	54 48	+ 229.57	+ 5.82	+ 1	51.7	+ 10.7	14	9	33.3
26 SA	+ 13	14 26	+ 235.39	+ 5.74	+ 2	2.4	+ 10.2	14	13	29.9
27 SU	+ 13	33 50	+ 241.13	+ 5.69	+ 2	12.6	+ 9.7	14	17	26.4
28 MO	+ 13	53 0	+ 246.82	+ 5.61	+ 2	22.2	+ 9.2	14	21	23.0
29 TU	+ 14	11 58	+ 252.43	+ 5.55	+ 2	31.4	+ 8.6	14	25	19.6
30 WE	+ 14	30 41	+ 257.98	+ 5.47	+ 2	40.0	+ 8.1	14	29	16.1

Table 2. Sun, 1975 for Zero Hours Universal Time (GMT) — Continued

Greenwich date	Apparent declination				Equation of time			Sidereal time		
	Degrees		Mils		Min	Sec	Daily change (sec)	Hr	Min	Sec
	°	' "	Mils	Daily change (mils)						
MAY 1 TH	+14 49 9		+ 263.45		+ 2	48.1		14	33	12.7
2 FR	+15 7 24	+1095	+ 268.86	+ 5.41	+ 2	55.7	+ 7.5	14	37	9.2
3 SA	+15 25 23	+1079	+ 274.19	+ 5.33	+ 3	2.7	+ 7.0	14	41	5.8
4 SU	+15 43 7	+1064	+ 279.44	+ 5.25	+ 3	9.1	+ 6.4	14	45	2.3
5 MO	+16 0 36	+1049	+ 284.62	+ 5.18	+ 3	15.0	+ 5.9	14	48	58.9
6 TU	+16 17 48	+1032	+ 289.72	+ 5.10	+ 3	20.3	+ 5.3	14	52	55.5
7 WE	+16 34 45	+1017	+ 294.74	+ 5.02	+ 3	25.0	+ 4.7	14	56	52.0
8 TH	+16 51 24	+ 999	+ 299.68	+ 4.94	+ 3	29.2	+ 4.1	15	0	48.6
9 FR	+17 7 47	+ 983	+ 304.53	+ 4.85	+ 3	32.7	+ 3.6	15	4	45.1
10 SA	+17 23 53	+ 966	+ 309.30	+ 4.77	+ 3	35.7	+ 3.0	15	8	41.7
11 SU	+17 39 42	+ 949	+ 313.98	+ 4.68	+ 3	38.1	+ 2.4	15	12	38.2
12 MO	+17 55 12	+ 930	+ 318.58	+ 4.60	+ 3	39.9	+ 1.8	15	16	34.8
13 TU	+18 10 25	+ 913	+ 323.09	+ 4.51	+ 3	41.2	+ 1.3	15	20	31.3
14 WE	+18 25 19	+ 894	+ 327.50	+ 4.41	+ 3	41.9	+ 0.7	15	24	27.9
15 TH	+18 39 55	+ 876	+ 331.83	+ 4.33	+ 3	42.0	+ 0.1	15	28	24.4
16 FR	+18 54 11	+ 856	+ 336.06	+ 4.23	+ 3	41.6	- 0.4	15	32	21.0
17 SA	+19 8 9	+ 838	+ 340.19	+ 4.13	+ 3	40.6	- 1.0	15	36	17.6
18 SU	+19 21 47	+ 818	+ 344.23	+ 4.04	+ 3	39.1	- 1.5	15	40	14.1
19 MO	+19 35 5	+ 798	+ 348.17	+ 3.94	+ 3	37.1	- 2.0	15	44	10.7
20 TU	+19 48 3	+ 778	+ 352.01	+ 3.84	+ 3	34.5	- 2.6	15	48	7.2
21 WE	+20 0 41	+ 758	+ 355.76	+ 3.75	+ 3	31.4	- 3.1	15	52	3.8
22 TH	+20 12 58	+ 737	+ 359.40	+ 3.64	+ 3	27.8	- 3.6	15	56	0.3
23 FR	+20 24 55	+ 717	+ 362.94	+ 3.54	+ 3	23.6	- 4.1	15	59	56.9
24 SA	+20 36 31	+ 696	+ 366.37	+ 3.43	+ 3	18.9	- 4.7	16	3	53.4
25 SU	+20 47 45	+ 674	+ 369.70	+ 3.33	+ 3	13.8	- 5.2	16	7	50.0
26 MO	+20 58 38	+ 653	+ 372.93	+ 3.23	+ 3	8.1	- 5.7	16	11	46.6
27 TU	+21 9 9	+ 631	+ 376.05	+ 3.12	+ 3	1.9	- 6.2	16	15	43.1
28 WE	+21 19 19	+ 610	+ 379.06	+ 3.01	+ 2	55.3	- 6.6	16	19	39.7
29 TH	+21 29 6	+ 587	+ 381.96	+ 2.90	+ 2	48.2	- 7.1	16	23	36.2
30 FR	+21 38 31	+ 565	+ 384.75	+ 2.79	+ 2	40.6	- 7.6	16	27	32.8
31 SA	+21 47 34	+ 543	+ 387.43	+ 2.68	+ 2	32.5	- 8.1	16	31	29.4
		+ 520		+ 2.56			- 8.5			

Table 2. Sun, 1975 for Zero Hours Universal Time (GMT) — Continued

Greenwich date	Apparent declination					Equation of time			Sidereal time		
	Degrees			Mils		Min	Sec	Daily change (sec)	Hr	Min	Sec
	°	'	"	Daily change (sec)	Daily change (mils)						
JUN 1 SU	+21	56	14		+ 389.99	+ 2	24.0		16	35	25.9
2 MO	+22	4	31	+ 497	+ 2.46	+ 2	15.1	- 8.9	16	39	22.5
3 TU	+22	12	25	+ 474	+ 2.34	+ 2	5.7	- 9.3	16	43	19.0
4 WE	+22	19	55	+ 450	+ 2.22	+ 1	56.0	- 9.7	16	47	15.6
5 TH	+22	27	2	+ 427	+ 2.11	+ 1	45.8	- 10.1	16	51	12.1
6 FR	+22	33	46	+ 404	+ 2.00	+ 1	35.4	- 10.5	16	55	8.7
7 SA	+22	40	6	+ 380	+ 1.87	+ 1	24.5	- 10.8	16	59	5.2
8 SU	+22	46	2	+ 356	+ 1.76	+ 1	13.4	- 11.1	17	3	1.8
9 MO	+22	51	34	+ 332	+ 1.64	+ 1	2.0	- 11.4	17	6	58.3
10 TU	+22	56	42	+ 308	+ 1.52	+ 0	50.3	- 11.7	17	10	54.9
11 WE	+23	1	26	+ 284	+ 1.40	+ 0	38.3	- 11.9	17	14	51.5
12 TH	+23	5	46	+ 260	+ 1.28	+ 0	26.1	- 12.2	17	18	48.0
13 FR	+23	9	41	+ 235	+ 1.17	+ 0	13.8	- 12.3	17	22	44.6
14 SA	+23	13	11	+ 210	+ 1.04	+ 0	1.3	- 12.5	17	26	41.2
15 SU	+23	16	17	+ 186	+ 0.91	- 0	11.4	- 12.6	17	30	37.7
16 MO	+23	18	59	+ 162	+ 0.80	- 0	24.1	- 12.8	17	34	34.3
17 TU	+23	21	16	+ 137	+ 0.68	- 0	37.0	- 12.9	17	38	30.8
18 WE	+23	23	8	+ 112	+ 0.55	- 0	49.9	- 12.9	17	42	27.4
19 TH	+23	24	35	+ 87	+ 0.43	- 1	2.9	- 12.9	17	46	23.9
20 FR	+23	25	37	+ 62	+ 0.31	- 1	15.8	- 13.0	17	50	20.5
21 SA	+23	26	15	+ 38	+ 0.19	- 1	28.8	- 13.0	17	54	17.0
22 SU	+23	26	28	+ 13	+ 0.06	- 1	41.8	- 12.9	17	58	13.6
23 MO	+23	26	16	- 12	- 0.06	- 1	54.7	- 12.9	18	2	10.2
24 TU	+23	25	40	- 36	- 0.18	- 2	7.6	- 12.9	18	6	6.7
25 WE	+23	24	38	- 62	- 0.30	- 2	20.4	- 12.8	18	10	3.3
26 TH	+23	23	12	- 86	- 0.43	- 2	33.1	- 12.7	18	13	59.8
27 FR	+23	21	22	- 110	- 0.54	- 2	45.7	- 12.6	18	17	56.4
28 SA	+23	19	6	- 136	- 0.67	- 2	58.1	- 12.4	18	21	53.0
29 SU	+23	16	26	- 160	- 0.79	- 3	10.4	- 12.3	18	25	49.5
30 MO	+23	13	21	- 185	- 0.91	- 3	22.5	- 12.1	18	29	46.1
				- 209	- 1.04			- 11.9			

Table 2. Sun, 1975 for Zero Hours Universal Time (GMT) — Continued

Greenwich date	Apparent declination					Equation of time			Sidereal time		
	Degrees			Mils		Min	Sec	Daily change (sec)	Hr	Min	Sec
	°	'	"	Daily change (sec)	Daily change (mils)						
JUL 1 TU	+23	9	52	- 233	+ 411.81 - 1.15	- 3	34.4	- 11.7	18	33	42.6
2 WE	+23	5	59	- 258	+ 410.66 - 1.27	- 3	46.1	- 11.4	18	37	39.2
3 TH	+23	1	41	- 281	+ 409.39 - 1.39	- 3	57.6	- 11.2	18	41	35.7
4 FR	+22	57	0	- 306	+ 408.00 - 1.51	- 4	8.8	- 10.9	18	45	32.3
5 SA	+22	51	54	- 330	+ 406.49 - 1.63	- 4	19.7	- 10.6	18	49	28.8
6 SU	+22	46	24	- 354	+ 404.86 - 1.75	- 4	30.3	- 10.3	18	53	25.4
7 MO	+22	40	30	- 377	+ 403.11 - 1.86	- 4	40.6	- 9.9	18	57	22.0
8 TU	+22	34	13	- 400	+ 401.25 - 1.98	- 4	50.5	- 9.5	19	1	18.5
9 WE	+22	27	33	- 424	+ 399.27 - 2.09	- 5	0.0	- 9.1	19	5	15.1
10 TH	+22	20	29	- 447	+ 397.18 - 2.21	- 5	9.2	- 8.7	19	9	11.6
11 FR	+22	13	2	- 470	+ 394.97 - 2.32	- 5	17.9	- 8.3	19	13	8.2
12 SA	+22	5	12	- 493	+ 392.65 - 2.43	- 5	26.2	- 7.8	19	17	4.8
13 SU	+21	56	59	- 515	+ 390.22 - 2.54	- 5	34.0	- 7.3	19	21	1.3
14 MO	+21	48	24	- 537	+ 387.68 - 2.66	- 5	41.4	- 6.8	19	24	57.9
15 TU	+21	39	27	- 560	+ 385.02 - 2.76	- 5	48.3	- 6.3	19	28	54.4
16 WE	+21	30	7	- 581	+ 382.26 - 2.87	- 5	54.6	- 5.8	19	32	51.0
17 TH	+21	20	26	- 603	+ 379.39 - 2.98	- 6	0.4	- 5.3	19	36	47.5
18 FR	+21	10	23	- 625	+ 376.41 - 3.09	- 6	5.7	- 4.7	19	40	44.1
19 SA	+20	59	58	- 646	+ 373.32 - 3.18	- 6	10.4	- 4.2	19	44	40.6
20 SU	+20	49	12	- 666	+ 370.14 - 3.30	- 6	14.6	- 3.6	19	48	37.2
21 MO	+20	38	6	- 688	+ 366.84 - 3.39	- 6	18.2	- 3.0	19	52	33.8
22 TU	+20	26	38	- 708	+ 363.45 - 3.50	- 6	21.3	- 2.5	19	56	30.3
23 WE	+20	14	50	- 729	+ 359.95 - 3.60	- 6	23.7	- 1.9	20	0	26.9
24 TH	+20	2	41	- 748	+ 356.35 - 3.69	- 6	25.6	- 1.3	20	4	23.4
25 FR	+19	50	13	- 768	+ 352.66 - 3.80	- 6	26.9	- 0.8	20	8	20.0
26 SA	+19	37	25	- 788	+ 348.86 - 3.89	- 6	27.7	- 0.2	20	12	16.5
27 SU	+19	24	17	- 808	+ 344.97 - 3.99	- 6	27.9	+ 0.4	20	16	13.1
28 MO	+19	10	49	- 826	+ 340.98 - 4.08	- 6	27.4	+ 1.0	20	20	9.6
29 TU	+18	57	3	- 845	+ 336.90 - 4.17	- 6	26.4	+ 1.6	20	24	6.2
30 WE	+18	42	58	- 864	+ 332.73 - 4.27	- 6	24.8	+ 2.2	20	28	2.7
31 TH	+18	28	34	- 882	+ 328.46 - 4.35	- 6	22.6	+ 2.8	20	31	59.3

Table 2. Sun, 1975 for Zero Hours Universal Time (GMT) — Continued

Greenwich date	Apparent declination				Equation of time			Sidereal time		
	Degrees		Mils				Daily change (sec)			
	°	'	''	Daily change (sec)	Mils	Daily change (mils)		Min	Sec	Hr Min Sec
AUG 1 FR	+18	13	52		+ 324.11			- 6	19.8	20 35 55.8
2 SA	+17	58	52	- 900	+ 319.66	- 4.45	+ 3.4	- 6	16.5	20 39 52.4
3 SU	+17	43	34	- 918	+ 315.13	- 4.53	+ 3.9	- 6	12.5	20 43 49.0
4 MO	+17	27	59	- 935	+ 310.52	- 4.61	+ 4.5	- 6	8.0	20 47 45.5
5 TU	+17	12	7	- 952	+ 305.81	- 4.71	+ 5.1	- 6	2.8	20 51 42.1
6 WE	+16	55	59	- 968	+ 301.03	- 4.78	+ 5.7	- 5	57.1	20 55 38.6
7 TH	+16	39	33	- 986	+ 296.16	- 4.87	+ 6.3	- 5	50.8	20 59 35.2
8 FR	+16	22	52	-1001	+ 291.22	- 4.94	+ 6.9	- 5	43.9	21 3 31.8
9 SA	+16	5	55	-1017	+ 286.20	- 5.02	+ 7.5	- 5	36.4	21 7 28.3
10 SU	+15	48	42	-1033	+ 281.10	- 5.10	+ 8.1	- 5	28.3	21 11 24.9
11 MO	+15	31	15	-1047	+ 275.92	- 5.18	+ 8.7	- 5	19.6	21 15 21.4
12 TU	+15	13	32	-1063	+ 270.68	- 5.24	+ 9.3	- 5	10.4	21 19 18.0
13 WE	+14	55	35	-1077	+ 265.36	- 5.32	+ 9.9	- 5	0.5	21 23 14.5
14 TH	+14	37	24	-1091	+ 259.97	- 5.39	+ 10.4	- 4	50.1	21 27 11.1
15 FR	+14	18	59	-1105	+ 254.51	- 5.46	+ 11.0	- 4	39.1	21 31 7.6
16 SA	+14	0	20	-1119	+ 248.99	- 5.52	+ 11.6	- 4	27.5	21 35 4.2
17 SU	+13	41	28	-1132	+ 243.40	- 5.59	+ 12.1	- 4	15.4	21 39 0.7
18 MO	+13	22	23	-1145	+ 237.74	- 5.66	+ 12.6	- 4	2.8	21 42 57.3
19 TU	+13	3	5	-1158	+ 232.03	- 5.71	+ 13.2	- 3	49.6	21 46 53.9
20 WE	+12	43	35	-1170	+ 226.25	- 5.78	+ 13.7	- 3	35.9	21 50 50.4
21 TH	+12	23	53	-1182	+ 220.41	- 5.84	+ 14.2	- 3	21.8	21 54 47.0
22 FR	+12	4	0	-1193	+ 214.52	- 5.89	+ 14.6	- 3	7.1	21 58 43.5
23 SA	+11	43	54	-1206	+ 208.57	- 5.95	+ 15.1	- 2	52.1	22 2 40.1
24 SU	+11	23	38	-1216	+ 202.56	- 6.01	+ 15.5	- 2	36.5	22 6 36.6
25 MO	+11	3	11	-1227	+ 196.50	- 6.06	+ 16.0	- 2	20.6	22 10 33.2
26 TU	+10	42	33	-1238	+ 190.38	- 6.12	+ 16.4	- 2	4.2	22 14 29.7
27 WE	+10	21	45	-1248	+ 184.22	- 6.16	+ 16.8	- 1	47.4	22 18 26.3
28 TH	+10	0	47	-1258	+ 178.01	- 6.21	+ 17.1	- 1	30.3	22 22 22.8
29 FR	+ 9	39	39	-1268	+ 171.75	- 6.26	+ 17.5	- 1	12.7	22 26 19.4
30 SA	+ 9	18	22	-1277	+ 165.44	- 6.31	+ 17.8	- 0	54.9	22 30 15.9
31 SU	+ 8	56	56	-1286	+ 159.09	- 6.35	+ 18.2	- 0	36.7	22 34 12.5
				-1295		- 6.39	+ 18.5			

Table 2. Sun, 1975 for Zero Hours Universal Time (GMT) — Continued

Greenwich date	Apparent declination				Equation of time			Sidereal time		
	Degrees		Mils		Min	Sec	Daily change (sec)	Hr	Min	Sec
	°	' "	Daily change (sec)	Daily change (mils)						
SEP 1 MO	+ 8	35 21		+ 152.70	- 0	18.2		22	38	9.0
2 TU	+ 8	13 38	-1303	+ 146.26	+ 0	0.6	+ 18.8	22	42	5.6
3 WE	+ 7	51 47	-1311	+ 139.79	+ 0	19.7	+ 19.1	22	46	2.2
4 TH	+ 7	29 48	-1319	+ 133.27	+ 0	39.0	+ 19.3	22	49	58.7
5 FR	+ 7	7 42	-1326	+ 126.73	+ 0	58.6	+ 19.6	22	53	55.3
6 SA	+ 6	45 29	-1333	+ 120.14	+ 1	18.4	+ 19.8	22	57	51.8
7 SU	+ 6	23 9	-1340	+ 113.53	+ 1	38.4	+ 20.0	23	1	48.4
8 MO	+ 6	0 44	-1345	+ 106.88	+ 1	58.7	+ 20.3	23	5	44.9
9 TU	+ 5	38 12	-1352	+ 100.21	+ 2	19.2	+ 20.5	23	9	41.5
10 WE	+ 5	15 34	-1358	+ 93.50	+ 2	39.8	+ 20.6	23	13	38.0
11 TH	+ 4	52 52	-1362	+ 86.77	+ 3	0.6	+ 20.8	23	17	34.6
12 FR	+ 4	30 4	-1368	+ 80.02	+ 3	21.6	+ 21.0	23	21	31.1
13 SA	+ 4	7 12	-1372	+ 73.25	+ 3	42.7	+ 21.1	23	25	27.7
14 SU	+ 3	44 16	-1376	+ 66.45	+ 4	3.9	+ 21.2	23	29	24.2
15 MO	+ 3	21 16	-1380	+ 59.63	+ 4	25.2	+ 21.3	23	33	20.8
16 TU	+ 2	58 12	-1384	+ 52.80	+ 4	46.5	+ 21.4	23	37	17.3
17 WE	+ 2	35 5	-1387	+ 45.95	+ 5	7.9	+ 21.4	23	41	13.9
18 TH	+ 2	11 55	-1390	+ 39.08	+ 5	29.4	+ 21.4	23	45	10.4
19 FR	+ 1	48 42	-1393	+ 32.21	+ 5	50.8	+ 21.4	23	49	7.0
20 SA	+ 1	25 27	-1395	+ 25.32	+ 6	12.2	+ 21.4	23	53	3.5
21 SU	+ 1	2 9	-1398	+ 18.42	+ 6	33.6	+ 21.4	23	57	0.1
22 MO	+ 0	38 51	-1398	+ 11.51	+ 6	54.9	+ 21.3	0	0	56.6
23 TU	+ 0	15 30	-1401	+ 4.59	+ 7	16.1	+ 21.2	0	4	53.2
24 WE	- 0	7 51	-1401	- 2.33	+ 7	37.2	+ 21.1	0	8	49.7
25 TH	- 0	31 13	-1402	- 9.25	+ 7	58.1	+ 21.0	0	12	46.3
26 FR	- 0	54 36	-1403	- 16.18	+ 8	18.9	+ 20.8	0	16	42.8
27 SA	- 1	17 58	-1402	- 23.10	+ 8	39.6	+ 20.6	0	20	39.4
28 SU	- 1	41 21	-1403	- 30.03	+ 9	0.0	+ 20.4	0	24	36.0
29 MO	- 2	4 43	-1402	- 36.95	+ 9	20.2	+ 20.2	0	28	32.5
30 TU	- 2	28 3	-1400	- 43.87	+ 9	40.1	+ 19.9	0	32	29.1
			-1400	- 6.91			+ 19.7			

Table 2. Sun, 1975 for Zero Hours Universal Time (GMT) — Continued

Greenwich date	Apparent declination					Equation of time			Sidereal time		
	Degrees			Mils		Min	Sec	Daily change (sec)	Hr	Min	Sec
	°	'	"	Daily change (sec)	Mils						
OCT 1 WE	- 2	51	23		- 50.78	+ 9	59.8		0	36	25.6
				-1398	- 6.90			+ 19.4			
2 TH	- 3	14	41		- 57.68	+10	19.1		0	40	22.2
				-1395	- 6.89			+ 19.1			
3 FR	- 3	37	56		- 64.57	+10	38.2		0	44	18.7
				-1394	- 6.88			+ 18.8			
4 SA	- 4	1	10		- 71.45	+10	56.9		0	48	15.3
				-1390	- 6.87			+ 18.4			
5 SU	- 4	24	20		- 78.32	+11	15.3		0	52	11.8
				-1387	- 6.85			+ 18.1			
6 MO	- 4	47	27		- 85.17	+11	33.4		0	56	8.4
				-1384	- 6.84			+ 17.7			
7 TU	- 5	10	31		- 92.01	+11	51.1		1	0	4.9
				-1380	- 6.81			+ 17.3			
8 WE	- 5	33	31		- 98.82	+12	8.4		1	4	1.5
				-1375	- 6.79			+ 16.9			
9 TH	- 5	56	26		- 105.61	+12	25.3		1	7	58.0
				-1371	- 6.77			+ 16.5			
10 FR	- 6	19	17		- 112.38	+12	41.8		1	11	54.6
				-1366	- 6.74			+ 16.0			
11 SA	- 6	42	3		- 119.12	+12	57.8		1	15	51.1
				-1360	- 6.72			+ 15.6			
12 SU	- 7	4	43		- 125.84	+13	13.4		1	19	47.7
				-1354	- 6.69			+ 15.1			
13 MO	- 7	27	17		- 132.53	+13	28.6		1	23	44.3
				-1348	- 6.66			+ 14.6			
14 TU	- 7	49	45		- 139.19	+13	43.2		1	27	40.8
				-1342	- 6.62			+ 14.1			
15 WE	- 8	12	7		- 145.81	+13	57.3		1	31	37.4
				-1334	- 6.59			+ 13.6			
16 TH	- 8	34	21		- 152.40	+14	11.0		1	35	33.9
				-1327	- 6.56			+ 13.0			
17 FR	- 8	56	28		- 158.96	+14	24.0		1	39	30.5
				-1320	- 6.51			+ 12.5			
18 SA	- 9	18	28		- 165.47	+14	36.5		1	43	27.0
				-1311	- 6.48			+ 11.9			
19 SU	- 9	40	19		- 171.95	+14	48.4		1	47	23.5
				-1304	- 6.43			+ 11.3			
20 MO	-10	2	3		- 178.38	+14	59.7		1	51	20.1
				-1294	- 6.40			+ 10.7			
21 TU	-10	23	37		- 184.78	+15	10.3		1	55	16.6
				-1285	- 6.34			+ 10.0			
22 WE	-10	45	2		- 191.12	+15	20.3		1	59	13.2
				-1276	- 6.30			+ 9.3			
23 TH	-11	6	18		- 197.42	+15	29.7		2	3	9.8
				-1266	- 6.25			+ 8.7			
24 FR	-11	27	24		- 203.67	+15	38.4		2	7	6.3
				-1255	- 6.20			+ 8.0			
25 SA	-11	48	19		- 209.87	+15	46.3		2	11	2.9
				-1245	- 6.15			+ 7.2			
26 SU	-12	9	4		- 216.02	+15	53.5		2	14	59.4
				-1234	- 6.09			+ 6.5			
27 MO	-12	29	38		- 222.11	+16	0.0		2	18	56.0
				-1222	- 6.04			+ 5.8			
28 TU	-12	50	0		- 228.15	+16	5.8		2	22	52.5
				-1210	- 5.97			+ 5.0			
29 WE	-13	10	10		- 234.12	+16	10.8		2	26	49.1
				-1198	- 5.92			+ 4.2			
30 TH	-13	30	8		- 240.04	+16	15.0		2	30	45.6
				-1185	- 5.85			+ 3.4			
31 FR	-13	49	53		- 245.89	+16	18.4		2	34	42.2
				-1172	- 5.79			+ 2.6			

Table 2. Sun, 1975 for Zero Hours Universal Time (GMT) — Continued

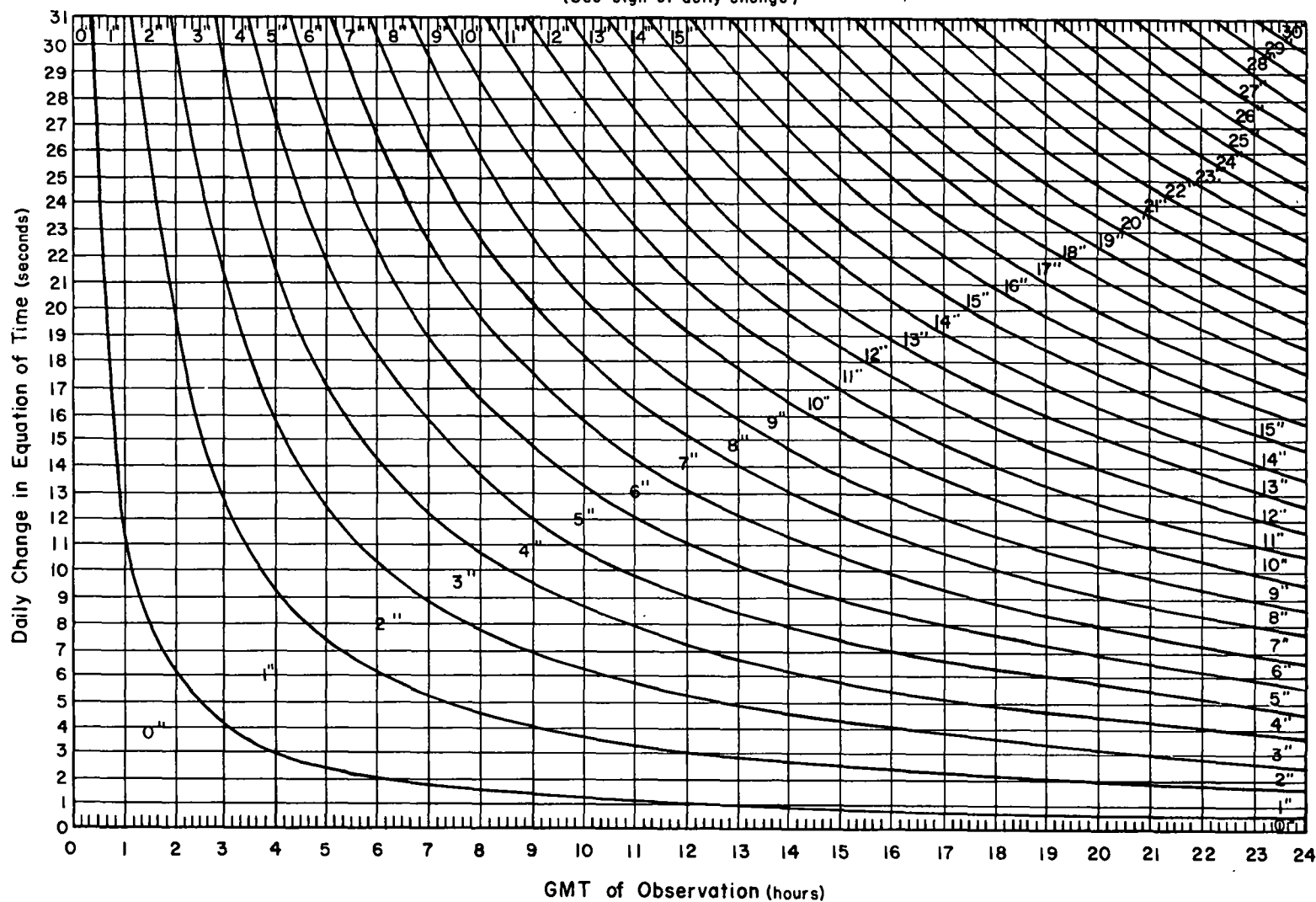
Greenwich date	Apparent declination				Equation of time			Sidereal time		
	Degrees		Mils		Min	Sec	Daily change (sec)	Hr	Min	Sec
	°	' "	Mils	Daily change (mils)						
NOV 1 SA	-14	9 25	-1159	- 251.68 - 5.72	+16	21.0	+ 1.8	2	38	38.7
2 SU	-14	28 44	-1144	- 257.40 - 5.65	+16	22.8	+ 1.0	2	42	35.3
3 MO	-14	47 48	-1130	- 263.05 - 5.58	+16	23.8	+ 0.2	2	46	31.9
4 TU	-15	6 38	-1116	- 268.63 - 5.51	+16	24.0	- 0.6	2	50	28.4
5 WE	-15	25 14	-1100	- 274.14 - 5.43	+16	23.4	- 1.4	2	54	25.0
6 TH	-15	43 34	-1084	- 279.57 - 5.36	+16	21.9	- 2.3	2	58	21.5
7 FR	-16	1 38	-1068	- 284.93 - 5.27	+16	19.7	- 3.1	3	2	18.1
8 SA	-16	19 26	-1052	- 290.20 - 5.20	+16	16.6	- 3.9	3	6	14.6
9 SU	-16	36 58	-1035	- 295.40 - 5.11	+16	12.7	- 4.7	3	10	11.2
10 MO	-16	54 13	-1018	- 300.51 - 5.02	+16	8.0	- 5.6	3	14	7.8
11 TU	-17	11 11	-1000	- 305.53 - 4.94	+16	2.4	- 6.4	3	18	4.3
12 WE	-17	27 51	- 982	- 310.47 - 4.85	+15	56.0	- 7.2	3	22	0.9
13 TH	-17	44 13	- 963	- 315.32 - 4.76	+15	48.8	- 8.0	3	25	57.4
14 FR	-18	0 16	- 945	- 320.08 - 4.66	+15	40.8	- 8.9	3	29	54.0
15 SA	-18	16 1	- 925	- 324.74 - 4.57	+15	31.9	- 9.7	3	33	50.5
16 SU	-18	31 26	- 906	- 329.31 - 4.48	+15	22.2	- 10.5	3	37	47.1
17 MO	-18	46 32	- 885	- 333.79 - 4.37	+15	11.6	- 11.4	3	41	43.6
18 TU	-19	1 17	- 866	- 338.16 - 4.27	+15	0.2	- 12.2	3	45	40.2
19 WE	-19	15 43	- 844	- 342.43 - 4.17	+14	48.0	- 13.0	3	49	36.7
20 TH	-19	29 47	- 824	- 346.60 - 4.07	+14	35.0	- 13.9	3	53	33.3
21 FR	-19	43 31	- 802	- 350.67 - 3.96	+14	21.1	- 14.7	3	57	29.9
22 SA	-19	56 53	- 780	- 354.63 - 3.86	+14	6.5	- 15.5	4	1	26.4
23 SU	-20	9 53	- 758	- 358.49 - 3.74	+13	51.0	- 16.3	4	5	23.0
24 MO	-20	22 31	- 736	- 362.23 - 3.63	+13	34.7	- 17.1	4	9	19.5
25 TU	-20	34 47	- 713	- 365.86 - 3.52	+13	17.6	- 17.9	4	13	16.1
26 WE	-20	46 40	- 689	- 369.38 - 3.41	+12	59.7	- 18.6	4	17	12.6
27 TH	-20	58 9	- 666	- 372.79 - 3.28	+12	41.0	- 19.4	4	21	9.2
28 FR	-21	9 15	- 642	- 376.07 - 3.18	+12	21.6	- 20.2	4	25	5.7
29 SA	-21	19 57	- 618	- 379.25 - 3.05	+12	1.4	- 20.9	4	29	2.3
30 SU	-21	30 15	- 593	- 382.30 - 2.93	+11	40.6	- 21.6	4	32	58.9

Table 2. Sun, 1975 for Zero Hours Universal Time (GMT) — Continued

Greenwich date	Apparent declination				Equation of time			Sidereal time		
	Degrees		Daily change (sec)	Mils		Min	Sec	Daily change (sec)	Hr	Min Sec
	°	' "		Mils	Daily change (mils)					
DEC 1 MO	-21	40 8	- 569	- 385.23	- 2.80	+11	19.0	- 22.3	4	36 55.4
2 TU	-21	49 37	- 544	- 388.03	- 2.69	+10	56.7	- 22.9	4	40 52.0
3 WE	-21	58 41	- 518	- 390.72	- 2.56	+10	33.8	- 23.5	4	44 48.5
4 TH	-22	7 19	- 492	- 393.28	- 2.43	+10	10.3	- 24.1	4	48 45.1
5 FR	-22	15 31	- 467	- 395.71	- 2.30	+ 9	46.2	- 24.7	4	52 41.7
6 SA	-22	23 18	- 440	- 398.01	- 2.18	+ 9	21.5	- 25.2	4	56 38.2
7 SU	-22	30 38	- 414	- 400.19	- 2.04	+ 8	56.3	- 25.7	5	0 34.8
8 MO	-22	37 32	- 388	- 402.23	- 1.92	+ 8	30.6	- 26.2	5	4 31.3
9 TU	-22	44 0	- 361	- 404.15	- 1.78	+ 8	4.4	- 26.6	5	8 27.9
10 WE	-22	50 1	- 334	- 405.93	- 1.65	+ 7	37.8	- 27.1	5	12 24.4
11 TH	-22	55 35	- 306	- 407.58	- 1.51	+ 7	10.7	- 27.4	5	16 21.0
12 FR	-23	0 41	- 279	- 409.09	- 1.38	+ 6	43.2	- 27.8	5	20 17.5
13 SA	-23	5 20	- 252	- 410.47	- 1.24	+ 6	15.4	- 28.1	5	24 14.1
14 SU	-23	9 32	- 224	- 411.71	- 1.11	+ 5	47.3	- 28.4	5	28 10.7
15 MO	-23	13 16	- 197	- 412.82	- 0.97	+ 5	18.8	- 28.7	5	32 7.2
16 TU	-23	16 33	- 168	- 413.79	- 0.83	+ 4	50.1	- 29.0	5	36 3.8
17 WE	-23	19 21	- 141	- 414.62	- 0.70	+ 4	21.1	- 29.2	5	40 0.3
18 TH	-23	21 42	- 112	- 415.32	- 0.55	+ 3	52.0	- 29.4	5	43 56.9
19 FR	-23	23 34	- 85	- 415.87	- 0.42	+ 3	22.6	- 29.5	5	47 53.5
20 SA	-23	24 59	- 56	- 416.29	- 0.28	+ 2	53.1	- 29.6	5	51 50.0
21 SU	-23	25 55	- 28	- 416.57	- 0.14	+ 2	23.5	- 29.7	5	55 46.6
22 MO	-23	26 23	+ 0	- 416.71	+ 0.01	+ 1	53.7	- 29.8	5	59 43.1
23 TU	-23	26 23	+ 29	- 416.70	+ 0.14	+ 1	23.9	- 29.8	6	3 39.7
24 WE	-23	25 54	+ 57	- 416.56	+ 0.28	+ 0	54.1	- 29.8	6	7 36.2
25 TH	-23	24 57	+ 85	- 416.28	+ 0.42	+ 0	24.2	- 29.8	6	11 32.8
26 FR	-23	23 32	+ 113	- 415.86	+ 0.56	- 0	5.6	- 29.8	6	15 29.4
27 SA	-23	21 39	+ 142	- 415.30	+ 0.70	- 0	35.3	- 29.6	6	19 25.9
28 SU	-23	19 17	+ 169	- 414.60	+ 0.83	- 1	5.0	- 29.5	6	23 22.5
29 MO	-23	16 28	+ 198	- 413.77	+ 0.98	- 1	34.5	- 29.3	6	27 19.0
30 TU	-23	13 10	+ 226	- 412.79	+ 1.11	- 2	3.8	- 29.1	6	31 15.6
31 WE	-23	9 24	+ 253	- 411.68	+ 1.26	- 2	33.0	- 28.9	6	35 12.1
32 TH	-23	5 11		- 410.42		- 3	1.8		6	39 8.7

Table 3. Equation of Time Graph
EQUATION OF TIME -- PARTIAL DAY IN SECONDS

(Use sign of daily change)



Note: Enter table with value of daily change to the nearest second and of GMT to the nearest 10 minutes. Do not interpolate for values more accurate than the nearest second.

Table 4. Correction to Greenwich Mean Time Interval to Obtain Greenwich Sidereal Time Interval

GMT	0 ^h	1 ^h	2 ^h	3 ^h	4 ^h	5 ^h	6 ^h	7 ^h	8 ^h	9 ^h	10 ^h	11 ^h
m	m s	m s	m s	m s	m s	m s	m s	m s	m s	m s	m s	m s
0	0 0.0	0 0.0	0 19.7	0 29.6	0 39.4	0 40.3	0 59.1	1 9.0	1 18.9	1 28.7	1 38.6	1 48.4
1	0.2	10.0	19.9	29.7	39.6	49.4	59.3	9.2	19.0	28.9	38.7	48.6
2	0.3	10.2	20.0	29.9	39.8	49.6	59.5	9.3	19.2	29.0	38.9	48.8
3	0.5	10.3	20.2	30.1	39.9	49.8	59.6	9.5	19.3	29.2	39.1	49.0
4	0.7	10.5	20.4	30.2	40.1	49.9	59.8	9.7	19.5	29.4	39.2	49.1
5	0 0.8	0 10.7	0 20.5	0 30.4	0 40.2	0 50.1	1 0.0	1 9.8	1 19.7	1 29.5	1 39.4	1 49.2
6	1.0	10.8	20.7	30.6	40.4	50.3	0.1	10.0	19.8	29.7	39.6	49.4
7	1.2	11.0	20.9	30.7	40.6	50.4	0.3	10.1	20.0	29.9	39.7	49.6
8	1.3	11.2	21.0	30.9	40.7	50.6	0.5	10.3	20.2	30.0	39.9	49.7
9	1.5	11.3	21.2	31.0	40.9	50.8	0.6	10.5	20.3	30.2	40.0	49.9
10	0 1.6	0 11.5	0 21.4	0 31.2	0 41.1	0 50.9	1 0.8	1 10.6	1 20.5	1 30.4	1 40.2	1 50.1
11	1.8	11.7	21.5	31.4	41.2	51.1	0.9	10.8	20.7	30.5	40.4	50.2
12	2.0	11.8	21.7	31.5	41.4	51.3	1.1	11.0	20.8	30.7	40.5	50.4
13	2.1	12.0	21.8	31.7	41.6	51.4	1.3	11.1	21.0	30.8	40.7	50.6
14	2.3	12.2	22.0	31.9	41.7	51.6	1.4	11.3	21.2	31.0	40.9	50.7
15	0 2.5	0 12.3	0 22.2	0 32.0	0 41.9	0 51.7	1 1.6	1 11.5	1 21.3	1 31.2	1 41.0	1 50.9
16	2.6	12.5	22.3	32.2	42.1	51.9	1.8	11.6	21.5	31.3	41.2	51.0
17	2.8	12.6	22.5	32.4	42.2	52.1	1.9	11.8	21.6	31.5	41.4	51.2
18	3.0	12.8	22.7	32.5	42.4	52.2	2.1	12.0	21.8	31.7	41.5	51.4
19	3.1	13.0	22.8	32.7	42.5	52.4	2.3	12.1	22.0	31.8	41.7	51.5
20	0 3.3	0 13.1	0 23.0	0 32.9	0 42.7	0 52.6	1 2.4	1 12.3	1 22.1	1 32.0	1 41.8	1 51.7
21	3.4	13.3	23.2	33.0	42.9	52.7	2.6	12.4	22.3	32.2	42.0	51.9
22	3.6	13.5	23.3	33.2	43.0	52.9	2.8	12.6	22.5	32.3	42.2	52.0
23	3.8	13.6	23.5	33.3	43.2	53.1	2.9	12.8	22.6	32.5	42.3	52.2
24	3.9	13.8	23.7	33.5	43.4	53.2	3.1	12.9	22.8	32.7	42.5	52.4
25	0 4.1	0 14.0	0 23.8	0 33.7	0 43.5	0 53.4	1 3.2	1 13.1	1 23.0	1 32.8	1 42.7	1 52.5
26	4.3	14.1	24.0	33.8	43.7	53.6	3.4	13.3	23.1	33.0	42.8	52.7
27	4.4	14.3	24.1	34.0	43.9	53.7	3.6	13.4	23.3	33.1	43.0	52.9
28	4.6	14.5	24.3	34.2	44.0	53.9	3.7	13.6	23.5	33.3	43.2	53.0
29	4.8	14.6	24.5	34.3	44.2	54.0	3.9	13.8	23.6	33.5	43.3	53.2
30	0 4.0	0 14.8	0 24.6	0 34.5	0 44.4	0 54.2	1 4.1	1 13.9	1 23.8	1 33.6	1 43.5	1 53.3
31	5.1	14.9	24.8	34.7	44.5	54.4	4.2	14.1	23.9	33.8	43.7	53.5
32	5.3	15.1	25.0	34.8	44.7	54.5	4.4	14.3	24.1	34.0	43.8	53.7
33	5.4	15.3	25.1	35.0	44.8	54.7	4.6	14.4	24.3	34.1	44.0	53.8
34	5.6	15.4	25.3	35.2	45.0	54.9	4.7	14.6	24.4	34.3	44.2	54.0
35	0 5.8	0 15.6	0 25.5	0 35.3	0 45.2	0 55.0	1 4.0	1 14.7	1 24.6	1 34.5	1 44.3	1 54.2
36	5.9	15.8	25.6	35.5	45.3	55.2	5.1	14.9	24.8	34.6	44.5	54.3
37	6.1	15.9	25.8	35.6	45.5	55.4	5.2	15.1	24.9	34.8	44.6	54.5
38	6.2	16.1	26.0	35.8	45.7	55.5	5.4	15.2	25.1	35.0	44.8	54.7
39	6.4	16.3	26.1	36.0	45.8	55.7	5.5	15.4	25.3	35.1	45.0	54.8
40	0 6.6	0 16.4	0 26.3	0 36.1	0 46.0	0 55.9	1 5.7	1 15.6	1 25.4	1 35.3	1 45.1	1 55.0
41	6.7	16.6	26.4	36.3	46.2	56.0	5.9	15.7	25.6	35.4	45.3	55.2
42	6.0	16.8	26.6	36.5	46.3	56.2	6.0	15.9	25.8	35.6	45.5	55.3
43	7.1	16.9	26.8	36.6	46.5	56.3	6.2	16.1	25.9	35.8	45.6	55.5
44	7.2	17.1	26.0	36.8	46.7	56.5	6.4	16.2	26.1	35.9	45.8	55.6
45	0 7.4	0 17.2	0 27.1	0 37.0	0 46.8	0 56.7	1 6.5	1 16.4	1 26.2	1 36.1	1 46.0	1 55.8
46	7.6	17.4	27.3	37.1	47.0	56.8	6.7	16.6	26.4	36.3	46.1	56.0
47	7.7	17.6	27.4	37.3	47.1	57.0	6.9	16.7	26.6	36.4	46.3	56.1
48	7.9	17.7	27.6	37.5	47.3	57.2	7.0	16.9	26.7	36.6	46.4	56.3
49	8.0	17.9	27.8	37.6	47.5	57.3	7.2	17.0	26.9	36.8	46.6	56.5
50	0 8.2	0 18.1	0 27.9	0 37.8	0 47.6	0 57.5	1 7.4	1 17.2	1 27.1	1 36.9	1 46.8	1 56.6
51	8.4	18.2	28.1	37.9	47.8	57.7	7.5	17.4	27.2	37.1	46.9	56.8
52	8.5	18.4	28.3	38.1	48.0	57.8	7.7	17.5	27.4	37.3	47.1	57.0
53	8.7	18.6	28.4	38.3	48.1	58.0	7.8	17.7	27.6	37.4	47.3	57.1
54	8.9	18.7	28.6	38.4	48.3	58.2	8.0	17.9	27.7	37.6	47.4	57.3
55	0 9.0	0 18.9	0 28.7	0 38.6	0 48.5	0 58.3	1 8.2	1 18.0	1 27.9	1 37.7	1 47.6	1 57.5
56	9.2	19.1	28.9	38.8	48.6	58.5	8.3	18.2	28.1	37.9	47.8	57.6
57	9.4	19.2	29.1	38.9	48.8	58.6	8.5	18.4	28.2	38.1	47.9	57.8
58	9.5	19.4	29.2	39.1	49.0	58.8	8.7	18.5	28.4	38.2	48.1	57.9
59	9.7	19.5	29.4	39.3	49.1	59.0	8.8	18.7	28.5	38.4	48.3	58.1

Table 4. Correction to Greenwich Mean Time Interval to Obtain Greenwich Sidereal Time Interval—Continued

GMT	12 ^h	13 ^h	14 ^h	15 ^h	16 ^h	17 ^h	18 ^h	19 ^h	20 ^h	21 ^h	22 ^h	23 ^h
m	m s	m s	m s	m s	m s	m s	m s	m s	m s	m s	m s	m s
0	1 58.3	2 8.1	2 18.0	2 27.8	2 37.7	2 47.6	2 57.4	3 7.3	3 17.1	3 27.0	3 36.8	3 46.7
1	58.4	8.3	18.2	28.0	37.9	47.7	57.6	7.4	17.3	27.2	37.0	46.9
2	58.6	8.5	18.3	28.2	38.0	47.9	57.7	7.6	17.5	27.3	37.2	47.0
3	58.8	8.6	18.5	28.3	38.2	48.1	57.9	7.8	17.6	27.5	37.3	47.2
4	58.9	8.8	18.6	28.5	38.4	48.2	58.1	7.9	17.8	27.6	37.5	47.4
5	1 59.1	2 9.0	2 18.8	2 28.7	2 38.5	2 48.4	2 58.2	3 8.1	3 18.0	3 27.8	3 37.7	3 47.5
6	59.3	9.1	19.0	28.8	38.7	48.5	58.4	8.3	18.1	28.0	37.8	47.7
7	59.4	9.3	19.1	29.0	38.9	48.7	58.6	8.4	18.3	28.1	38.0	47.8
8	59.6	9.4	19.3	29.2	39.0	48.9	58.7	8.6	18.4	28.3	38.2	48.0
9	59.8	9.6	19.5	29.3	39.2	49.0	58.9	8.8	18.6	28.5	38.3	48.2
10	1 59.9	2 9.8	2 19.6	2 29.5	2 39.3	2 49.2	2 59.1	3 8.9	3 18.8	3 28.6	3 38.5	3 48.3
11	2 0.1	9.9	19.8	29.7	39.5	49.4	59.2	9.1	18.9	28.8	38.6	48.5
12	0.2	10.1	20.0	29.8	39.7	49.5	59.4	9.2	19.1	29.0	38.8	48.7
13	0.4	10.3	20.1	30.0	39.8	49.7	59.6	9.4	19.3	29.1	39.0	48.8
14	0.6	10.4	20.3	30.1	40.0	49.9	59.7	9.6	19.4	29.3	39.1	49.0
15	2 0.7	2 10.6	2 20.5	2 30.3	2 40.2	2 50.0	2 59.9	3 9.7	3 19.6	3 29.4	3 39.3	3 49.2
16	0.9	10.8	20.6	30.5	40.3	50.2	3 0.0	9.9	19.8	29.6	39.5	49.3
17	1.1	10.9	20.8	30.6	40.5	50.4	0.2	10.1	19.9	29.8	39.6	49.5
18	1.2	11.1	20.9	30.8	40.7	50.5	0.4	10.2	20.1	29.9	39.8	49.7
19	1.4	11.3	21.1	31.0	40.8	50.7	0.5	10.4	20.3	30.1	40.0	49.8
20	2 1.6	2 11.4	2 21.3	2 31.1	2 41.0	2 50.8	3 0.7	3 10.6	3 20.4	3 30.3	3 40.1	3 50.0
21	1.7	11.6	21.4	31.3	41.2	51.0	0.9	10.7	20.6	30.4	40.3	50.1
22	1.9	11.7	21.6	31.5	41.3	51.2	1.0	10.9	20.7	30.6	40.5	50.3
23	2.1	11.9	21.8	31.6	41.5	51.3	1.2	11.1	20.9	30.8	40.6	50.5
24	2.2	12.1	21.9	31.8	41.6	51.5	1.4	11.2	21.1	30.9	40.8	50.6
25	2 2.4	2 12.2	2 22.1	2 32.0	2 41.8	2 51.7	3 1.5	3 11.4	3 21.2	3 31.1	3 40.9	3 50.8
26	2.5	12.4	22.3	32.1	42.0	51.8	1.7	11.5	21.4	31.3	41.1	51.0
27	2.7	12.6	22.4	32.3	42.1	52.0	1.9	11.7	21.6	31.4	41.3	51.1
28	2.9	12.7	22.6	32.4	42.3	52.2	2.0	11.9	21.7	31.6	41.4	51.3
29	3.0	12.9	22.8	32.6	42.5	52.3	2.2	12.0	21.9	31.8	41.6	51.5
30	2 3.2	2 13.1	2 22.9	2 32.8	2 42.6	2 52.5	3 2.3	3 12.2	3 22.1	3 31.9	3 41.8	3 51.6
31	3.4	13.2	23.1	32.9	42.8	52.7	2.5	12.4	22.2	32.1	41.9	51.8
32	3.5	13.4	23.2	33.1	43.0	52.8	2.7	12.5	22.4	32.2	42.1	52.0
33	3.7	13.6	23.4	33.3	43.1	53.0	2.8	12.7	22.6	32.4	42.3	52.1
34	3.9	13.7	23.6	33.4	43.3	53.1	3.0	12.9	22.7	32.6	42.4	52.3
35	2 4.0	2 13.9	2 23.7	2 33.6	2 43.5	2 53.3	3 3.2	3 13.0	3 22.9	3 32.7	3 42.6	3 52.4
36	4.2	14.0	23.9	33.8	43.6	53.5	3.3	13.2	23.0	32.9	42.8	52.6
37	4.4	14.2	24.1	33.9	43.8	53.6	3.5	13.4	23.2	33.1	42.9	52.8
38	4.5	14.4	24.2	34.1	43.9	53.8	3.7	13.5	23.4	33.2	43.1	52.9
39	4.7	14.5	24.4	34.3	44.1	54.0	3.8	13.7	23.5	33.4	43.2	53.1
40	2 4.8	2 14.7	2 24.6	2 34.4	2 44.3	2 54.1	3 4.0	3 13.8	3 23.7	3 33.6	3 43.4	3 53.3
41	5.0	14.9	24.7	34.6	44.4	54.3	4.2	14.0	23.9	33.7	43.6	53.4
42	5.2	15.0	24.9	34.7	44.6	54.5	4.3	14.2	24.0	33.9	43.7	53.6
43	5.3	15.2	25.1	34.9	44.8	54.6	4.5	14.3	24.2	34.0	43.9	53.8
44	5.5	15.4	25.2	35.1	44.9	54.8	4.6	14.5	24.4	34.2	44.1	53.9
45	2 5.7	2 15.5	2 25.4	2 35.2	2 45.1	2 55.0	3 4.8	3 14.7	3 24.5	3 34.4	3 44.2	3 54.1
46	5.8	15.7	25.5	35.4	45.3	55.1	5.0	14.8	24.7	34.5	44.4	54.3
47	6.0	15.9	25.7	35.6	45.4	55.3	5.1	15.0	24.8	34.7	44.6	54.4
48	6.2	16.0	25.9	35.7	45.6	55.4	5.3	15.2	25.0	34.9	44.7	54.6
49	6.3	16.2	26.0	35.9	45.8	55.6	5.5	15.3	25.2	35.0	44.9	54.7
50	2 6.5	2 16.3	2 26.2	2 36.1	2 45.9	2 55.8	3 5.6	3 15.5	3 25.3	3 35.2	3 45.1	3 54.9
51	6.7	16.5	26.4	36.2	46.1	55.9	5.8	15.7	25.5	35.4	45.2	55.1
52	6.8	16.7	26.5	36.4	46.2	56.1	6.0	15.8	25.7	35.5	45.4	55.2
53	7.0	16.8	26.7	36.6	46.4	56.3	6.1	16.0	25.8	35.7	45.5	55.4
54	7.1	17.0	26.9	36.7	46.6	56.4	6.3	16.1	26.0	35.9	45.7	55.6
55	2 7.3	2 17.2	2 27.0	2 36.9	2 46.7	2 56.6	3 6.5	3 16.3	3 26.2	3 36.0	3 45.9	3 55.7
56	7.5	17.3	27.2	37.0	46.9	56.8	6.6	16.5	26.3	36.2	46.0	55.9
57	7.6	17.5	27.4	37.2	47.1	56.9	6.8	16.6	26.5	36.4	46.2	56.1
58	7.8	17.7	27.5	37.4	47.2	57.1	6.9	16.8	26.7	36.5	46.4	56.2
59	8.0	17.8	27.7	37.5	47.4	57.3	7.1	17.0	26.8	36.7	46.5	56.4

Table 6a. Conversion of Time to Arc

Time			Arc			Time			Arc			Time			Arc			
Hours	°	Mile	Min	°	'	Mile	Min	°	'	Mile	Min	°	'	Mile	Min	°	'	Mile
1	15	266.67	1	0	15	4.44	21	5	15	93.33	41	10	15	182.22				
2	30	533.33	2	0	30	8.89	22	5	30	97.78	42	10	30	186.67				
3	45	800.00	3	0	45	13.33	23	5	45	102.22	43	10	45	191.11				
4	60	1066.67	4	1	00	17.78	24	6	00	106.67	44	11	00	195.56				
5	75	1333.33	5	1	15	22.22	25	6	15	111.11	45	11	15	200.00				
6	90	1600.00	6	1	30	26.67	26	6	30	115.56	46	11	30	204.44				
7	105	1866.67	7	1	45	31.11	27	6	45	120.00	47	11	45	208.89				
8	120	2133.33	8	2	00	35.56	28	7	00	124.44	48	12	00	213.33				
9	135	2400.00	9	2	15	40.00	29	7	15	128.89	49	12	15	217.78				
10	150	2666.67	10	2	30	44.44	30	7	30	133.33	50	12	30	222.22				
11	165	2933.33	11	2	45	48.89	31	7	45	137.78	51	12	45	226.67				
12	180	3200.00	12	3	00	53.33	32	8	00	142.22	52	13	00	231.11				
13	195	3466.67	13	3	15	57.78	33	8	15	146.67	53	13	15	235.56				
14	210	3733.33	14	3	30	62.22	34	8	30	151.11	54	13	30	240.00				
15	225	4000.00	15	3	45	66.67	35	8	45	155.56	55	13	45	244.44				
16	240	4266.67	16	4	00	71.11	36	9	00	160.00	56	14	00	248.89				
17	255	4533.33	17	4	15	75.56	37	9	15	164.44	57	14	15	253.33				
18	270	4800.00	18	4	30	80.00	38	9	30	168.89	58	14	30	257.78				
19	285	5066.67	19	4	45	84.44	39	9	45	173.33	59	14	45	262.22				
20	300	5333.33	20	5	00	88.89	40	10	00	177.78	60	15	00	266.67				
21	315	5600.00																
22	330	5866.67																
23	345	6133.33																
24	360	6400.00																

Time				Arc				Time				Arc			
Sec	'	°	Mile	Sec	'	°	Mile	Sec	'	°	Mile	Sec	'	°	Mile
1	0	15	.07	16	4	00	1.19	31	7	45	2.30	46	11	30	3.41
2	0	30	.15	17	4	15	1.26	32	8	00	2.37	47	11	45	3.48
3	0	45	.22	18	4	30	1.33	33	8	15	2.44	48	12	00	3.56
4	1	00	.30	19	4	45	1.41	34	8	30	2.52	49	12	15	3.63
5	1	15	.37	20	5	00	1.48	35	8	45	2.59	50	12	30	3.70
6	1	30	.44	21	5	15	1.56	36	9	00	2.67	51	12	45	3.78
7	1	45	.52	22	5	30	1.63	37	9	15	2.74	52	13	00	3.85
8	2	00	.59	23	5	45	1.70	37	9	30	2.81	53	13	15	3.93
9	2	15	.67	24	6	00	1.78	39	9	45	2.89	54	13	30	4.00
10	2	30	.74	25	6	15	1.85	40	10	00	2.96	55	13	45	4.07
11	2	45	.81	26	6	30	1.93	41	10	15	3.04	56	14	00	4.15
12	3	00	.89	27	6	45	2.00	42	10	30	3.11	57	14	15	4.22
13	3	15	.96	28	7	00	2.07	43	10	45	3.19	58	14	30	4.30
14	3	30	1.04	29	7	15	2.15	44	11	00	3.26	59	14	45	4.37
15	3	45	1.11	30	7	30	2.22	45	11	15	3.33	60	15	00	4.44

Example: Time is 22 hours, 46 minutes, 37 seconds. Convert to arc.

22 hours time = 330° arc

46 minutes time = 11° 30' arc

37 seconds time = 9' 15" arc

22° 46' 37" 341° 39' 15" arc

Table 5b. Conversion of Arc to Time

DEGREES						MINUTES		SECONDS					
°	'	"	°	'	"	'	"	°	'	"	°	'	"
0	0	00	60	4	00	120	8 00	0	0	00	0	0	00
1	0	04	61	4	04	121	8 04	1	0	04	1	0	06
2	0	08	62	4	08	122	8 08	2	0	08	2	0	10
3	0	12	63	4	12	123	8 12	3	0	12	3	0	14
4	0	16	64	4	16	124	8 16	4	0	16	4	0	18
5	0	20	65	4	20	125	8 20	5	0	20	5	0	22
6	0	24	66	4	24	126	8 24	6	0	24	6	0	26
7	0	28	67	4	28	127	8 28	7	0	28	7	0	30
8	0	32	68	4	32	128	8 32	8	0	32	8	0	34
9	0	36	69	4	36	129	8 36	9	0	36	9	0	38
10	0	40	70	4	40	130	8 40	10	0	40	10	0	42
11	0	44	71	4	44	131	8 44	11	0	44	11	0	46
12	0	48	72	4	48	132	8 48	12	0	48	12	0	50
13	0	52	73	4	52	133	8 52	13	0	52	13	0	54
14	0	56	74	4	56	134	8 56	14	0	56	14	0	58
15	1	00	75	5	00	135	9 00	15	1	00	15	1	02
16	1	04	76	5	04	136	9 04	16	1	04	16	1	06
17	1	08	77	5	08	137	9 08	17	1	08	17	1	10
18	1	12	78	5	12	138	9 12	18	1	12	18	1	14
19	1	16	79	5	16	139	9 16	19	1	16	19	1	18
20	1	20	80	5	20	140	9 20	20	1	20	20	1	22
21	1	24	81	5	24	141	9 24	21	1	24	21	1	26
22	1	28	82	5	28	142	9 28	22	1	28	22	1	30
23	1	32	83	5	32	143	9 32	23	1	32	23	1	34
24	1	36	84	5	36	144	9 36	24	1	36	24	1	38
25	1	40	85	5	40	145	9 40	25	1	40	25	1	42
26	1	44	86	5	44	146	9 44	26	1	44	26	1	46
27	1	48	87	5	48	147	9 48	27	1	48	27	1	50
28	1	52	88	5	52	148	9 52	28	1	52	28	1	54
29	1	56	89	5	56	149	9 56	29	1	56	29	1	58
30	2	00	90	6	00	150	10 00	30	2	00	30	2	02
31	2	04	91	6	04	151	10 04	31	2	04	31	2	06
32	2	08	92	6	08	152	10 08	32	2	08	32	2	10
33	2	12	93	6	12	153	10 12	33	2	12	33	2	14
34	2	16	94	6	16	154	10 16	34	2	16	34	2	18
35	2	20	95	6	20	155	10 20	35	2	20	35	2	22
36	2	24	96	6	24	156	10 24	36	2	24	36	2	26
37	2	28	97	6	28	157	10 28	37	2	28	37	2	30
38	2	32	98	6	32	158	10 32	38	2	32	38	2	34
39	2	36	99	6	36	159	10 36	39	2	36	39	2	38
40	2	40	100	6	40	160	10 40	40	2	40	40	2	42
41	2	44	101	6	44	161	10 44	41	2	44	41	2	46
42	2	48	102	6	48	162	10 48	42	2	48	42	2	50
43	2	52	103	6	52	163	10 52	43	2	52	43	2	54
44	2	56	104	6	56	164	10 56	44	2	56	44	2	58
45	3	00	105	7	00	165	11 00	45	3	00	45	3	02
46	3	04	106	7	04	166	11 04	46	3	04	46	3	06
47	3	08	107	7	08	167	11 08	47	3	08	47	3	10
48	3	12	108	7	12	168	11 12	48	3	12	48	3	14
49	3	16	109	7	16	169	11 16	49	3	16	49	3	18
50	3	20	110	7	20	170	11 20	50	3	20	50	3	22
51	3	24	111	7	24	171	11 24	51	3	24	51	3	26
52	3	28	112	7	28	172	11 28	52	3	28	52	3	30
53	3	32	113	7	32	173	11 32	53	3	32	53	3	34
54	3	36	114	7	36	174	11 36	54	3	36	54	3	38
55	3	40	115	7	40	175	11 40	55	3	40	55	3	42
56	3	44	116	7	44	176	11 44	56	3	44	56	3	46
57	3	48	117	7	48	177	11 48	57	3	48	57	3	50
58	3	52	118	7	52	178	11 52	58	3	52	58	3	54
59	3	56	119	7	56	179	11 56	59	3	56	59	3	58

90° - 6"

180° - 12"

270° - 18"

Table 5c. Conversion of Degrees, Minutes, and Seconds to Miles

Degrees											
Deg	Mils	Deg	Mils	Deg	Mils	Deg	Mils	Deg	Mils	Deg	Mils
1	17.78	31	551.11	61	1084.44	91	1617.78	121	2151.11	151	2684.44
2	35.56	32	568.89	62	1102.22	92	1635.56	122	2168.89	152	2702.22
3	53.33	33	586.67	63	1120.00	93	1653.33	123	2186.67	153	2720.00
4	71.11	34	604.44	64	1137.78	94	1671.11	124	2204.44	154	2737.78
5	88.89	35	622.22	65	1155.56	95	1688.89	125	2222.22	155	2755.56
6	106.67	36	640.00	66	1173.33	96	1706.67	126	2240.00	156	2773.33
7	124.44	37	657.78	67	1191.11	97	1724.44	127	2257.78	157	2791.11
8	142.22	38	675.56	68	1208.89	98	1742.22	128	2275.56	158	2808.89
9	160.00	39	693.33	69	1226.67	99	1760.00	129	2293.33	159	2826.67
10	177.78	40	711.11	70	1244.44	100	1777.78	130	2311.11	160	2844.44
11	195.56	41	728.89	71	1262.22	101	1795.56	131	2328.89	161	2862.22
12	213.33	42	746.67	72	1280.00	102	1813.33	132	2346.67	162	2880.00
13	231.11	43	764.44	73	1297.78	103	1831.11	133	2364.44	163	2897.78
14	248.89	44	782.22	74	1315.56	104	1848.89	134	2382.22	164	2915.56
15	266.67	45	800.00	75	1333.33	105	1866.67	135	2400.00	165	2933.33
16	284.44	46	817.78	76	1351.11	106	1884.44	136	2417.78	166	2951.11
17	302.22	47	835.56	77	1368.89	107	1902.22	137	2435.56	167	2968.89
18	320.00	48	853.33	78	1386.67	108	1920.00	138	2453.33	168	2986.67
19	337.78	49	871.11	79	1404.44	109	1937.78	139	2471.11	169	3004.44
20	355.56	50	888.89	80	1422.22	110	1955.56	140	2488.89	170	3022.22
21	373.33	51	906.67	81	1440.00	111	1973.33	141	2506.67	171	3040.00
22	391.11	52	924.44	82	1457.78	112	1991.11	142	2524.44	172	3057.78
23	408.89	53	942.22	83	1475.56	113	2008.89	143	2542.22	173	3075.56
24	426.67	54	960.00	84	1493.33	114	2026.67	144	2560.00	174	3093.33
25	444.44	55	977.78	85	1511.11	115	2044.44	145	2577.78	175	3111.11
26	462.22	56	995.56	86	1528.89	116	2062.22	146	2595.56	176	3128.89
27	480.00	57	1013.33	87	1546.67	117	2080.00	147	2613.33	177	3146.67
28	497.78	58	1031.11	88	1564.44	118	2097.78	148	2631.11	178	3164.44
29	515.56	59	1048.89	89	1582.22	119	2115.56	149	2648.89	179	3182.22
30	533.33	60	1066.67	90	1600.00	120	2133.33	150	2666.67	180	3200.00

Minutes						Seconds					
Min	Mils	Min	Mils	Min	Mils	Sec	Mils	Sec	Mils	Sec	Mils
1	0.30	21	6.22	41	12.15	1	0.00	21	0.10	41	0.20
2	0.59	22	6.52	42	12.44	2	0.01	22	0.11	42	0.21
3	0.89	23	6.81	43	12.74	3	0.01	23	0.11	43	0.21
4	1.19	24	7.11	44	13.04	4	0.02	24	0.12	44	0.22
5	1.48	25	7.41	45	13.33	5	0.02	25	0.12	45	0.22
6	1.78	26	7.70	46	13.63	6	0.03	26	0.13	46	0.23
7	2.07	27	8.00	47	13.93	7	0.03	27	0.13	47	0.23
8	2.37	28	8.30	48	14.22	8	0.04	28	0.14	48	0.24
9	2.67	29	8.59	49	14.52	9	0.04	29	0.14	49	0.24
10	2.96	30	8.89	50	14.81	10	0.05	30	0.15	50	0.25
11	3.26	31	9.19	51	15.11	11	0.05	31	0.15	51	0.25
12	3.56	32	9.48	52	15.41	12	0.06	32	0.16	52	0.26
13	3.85	33	9.78	53	15.70	13	0.06	33	0.16	53	0.26
14	4.15	34	10.07	54	16.00	14	0.07	34	0.17	54	0.27
15	4.44	35	10.37	55	16.30	15	0.07	35	0.17	55	0.27
16	4.74	36	10.67	56	16.59	16	0.08	36	0.18	56	0.28
17	5.04	37	10.96	57	16.89	17	0.08	37	0.18	57	0.28
18	5.33	38	11.26	58	17.19	18	0.09	38	0.19	58	0.29
19	5.63	39	11.56	59	17.48	19	0.09	39	0.19	59	0.29
20	5.93	40	11.85	60	17.78	20	0.10	40	0.20	60	0.30

Table 6. Convergence

Northing = UTM grid northing coordinate of station in meters.

If in Northern Hemisphere, enter table with northing.

If in Southern Hemisphere, subtract northing of station from 10,000,000; enter table with resulting northing.

Enter table using northing to nearest 100 meters and interpolate.

Log XV = Log of function XV (sign always +).

Northing	Function XV	Diff.	Log XV	Diff.	Northing	Function XV	Diff.	Log XV	Diff.
0	0	5.109	0	70834	310,000	1585.0	51.2	3.20003	1426
1,000	5.109	5.109	0.70834	30103	320,000	1636.3	51.3	3.21386	1383
2,000	10.218	5.109	1.00937	17609	330,000	1687.5	51.2	3.22724	1338
3,000	15.327	5.109	1.18546	12494	340,000	1738.7	51.2	3.24022	1298
4,000	20.436	5.109	1.31040		350,000	1789.9	51.2	3.25283	1261
		5.109		9691			51.3		1227
5,000	25.545	5.109	1.40731	7918	360,000	1841.2	51.2	3.26510	1191
6,000	30.654	5.109	1.48649	6694	370,000	1892.4	51.3	3.27701	1162
7,000	35.763	5.109	1.55343	5800	380,000	1943.7	51.3	3.28863	1131
8,000	40.872	5.109	1.61143	5115	390,000	1995.0	51.3	3.29994	1103
9,000	45.981	5.109	1.66258		400,000	2046.3	51.3	3.31097	
		5.109		4576			51.3		1075
10,000	51.090	51.09	1.70834	30103	410,000	2097.6	51.3	3.32172	1050
20,000	102.18	51.09	2.00937	17609	420,000	2148.9	51.3	3.33222	1024
30,000	153.27	51.09	2.18546	12494	430,000	2200.2	51.3	3.34246	1001
40,000	204.36	51.10	2.31040	9692	440,000	2251.5	51.4	3.35247	981
50,000	255.46		2.40732		450,000	2302.9		3.36228	
		51.09		7918			51.3		956
60,000	306.55	51.10	2.48650	6696	460,000	2354.2	51.4	3.37184	938
70,000	357.65	51.09	2.55346	5799	470,000	2405.6	51.3	3.38122	917
80,000	408.74	51.10	2.61145	5116	480,000	2456.9	51.4	3.39039	899
90,000	459.84	51.10	2.66261	4576	490,000	2508.3	51.4	3.39938	881
100,000	510.94		2.70837		500,000	2559.7		3.40819	
		51.11		4141			51.4		863
110,000	562.05	51.10	2.74978	3779	510,000	2611.1	51.5	3.41682	849
120,000	613.15	51.11	2.78757	3477	520,000	2662.6	51.4	3.42531	830
130,000	664.26	51.12	2.82234	3220	530,000	2714.0	51.4	3.43361	815
140,000	715.38	51.11	2.85454	2997	540,000	2765.4	51.5	3.44176	801
150,000	766.49		2.88451		550,000	2816.9		3.44977	
		51.12		2804			51.5		787
160,000	817.61	51.13	2.91255	2634	560,000	2868.4	51.5	3.45764	773
170,000	868.74	51.13	2.93889	2484	570,000	2919.9	51.5	3.46537	759
180,000	919.87	51.13	2.96373	2340	580,000	2971.4	51.5	3.47296	746
190,000	971.00	51.1	2.98722	2227	590,000	3022.9	51.5	3.48042	734
200,000	1022.1		3.00949		600,000	3074.4		3.48776	
		51.2		2123			51.6		723
210,000	1073.3	51.1	3.03072	2020	610,000	3126.0	51.5	3.49499	710
220,000	1124.4	51.2	3.05092	1934	620,000	3177.5	51.6	3.50209	699
230,000	1175.6	51.1	3.07026	1848	630,000	3229.1	51.6	3.50908	689
240,000	1226.7	51.2	3.08874	1776	640,000	3280.7	51.6	3.51597	677
250,000	1277.9		3.10650		650,000	3332.3		3.52274	
		51.2		1706			51.7		669
260,000	1329.1	51.2	3.12356	1641	660,000	3384.0	51.6	3.52943	657
270,000	1380.3	51.1	3.13997	1579	670,000	3435.6	51.7	3.53600	649
280,000	1431.4	51.2	3.15576	1526	680,000	3487.3	51.7	3.54249	639
290,000	1482.6	51.2	3.17102	1475	690,000	3539.0	51.7	3.54888	630
300,000	1533.8		3.18577		700,000	3590.7		3.55518	

Table 6. Convergence—Continued

Northing	Function XV	Diff.	Log XV	Diff.	Northing	Function XV	Diff.	Log XV	Diff.
700,000	3500.7	51.7	3.55518	630					
710,000	3642.4	51.7	3.56139	621	1,160,000	5092.3	52.8	3.77750	384
720,000	3694.1	51.7	3.56751	612	1,170,000	6045.1	52.8	3.78140	381
730,000	3745.9	51.6	3.57356	605	1,180,000	6098.0	52.9	3.78510	379
740,000	3797.6	51.7	3.57951	595	1,190,000	6150.9	52.9	3.78894	375
750,000	3849.4	51.8	3.58539	588	1,200,000	6203.8	52.9	3.79266	372
760,000	3901.2	51.8	3.59120	581	1,210,000	6256.7	52.9	3.79635	369
770,000	3953.1	51.9	3.59694	574	1,220,000	6309.7	53.0	3.80001	366
780,000	4004.9	51.8	3.60259	565	1,230,000	6362.7	53.0	3.80364	363
790,000	4056.8	51.9	3.60818	559	1,240,000	6415.8	53.1	3.80725	361
800,000	4108.7	51.9	3.61370	552	1,250,000	6468.8	53.0	3.81082	357
810,000	4160.6	51.9	3.61916	546	1,260,000	6521.9	53.1	3.81437	355
820,000	4212.5	51.9	3.62454	538	1,270,000	6575.1	53.2	3.81790	353
830,000	4264.4	51.9	3.62986	532	1,280,000	6628.3	53.2	3.82140	350
840,000	4316.4	52.0	3.63512	526	1,290,000	6681.5	53.2	3.82487	347
850,000	4368.4	52.0	3.64032	520	1,300,000	6734.7	53.2	3.82832	345
860,000	4420.4	52.0	3.64546	514	1,310,000	6788.0	53.3	3.83174	342
870,000	4472.5	52.1	3.65055	509	1,320,000	6841.3	53.3	3.83514	340
880,000	4524.5	52.0	3.65557	502	1,330,000	6894.7	53.4	3.83852	338
890,000	4576.6	52.1	3.66054	497	1,340,000	6948.0	53.3	3.84186	334
900,000	4628.7	52.1	3.66546	492	1,350,000	7001.5	53.5	3.84519	333
910,000	4680.8	52.1	3.67032	486	1,360,000	7054.9	53.4	3.84849	330
920,000	4733.0	52.2	3.67514	482	1,370,000	7108.4	53.5	3.85177	328
930,000	4785.2	52.2	3.67990	476	1,380,000	7161.9	53.5	3.85503	326
940,000	4837.3	52.1	3.68460	470	1,390,000	7215.5	53.6	3.85827	324
950,000	4889.6	52.3	3.68927	467	1,400,000	7269.1	53.6	3.86148	321
960,000	4941.8	52.2	3.69389	462	1,410,000	7322.7	53.6	3.86467	319
970,000	4994.1	52.3	3.69846	457	1,420,000	7376.4	53.7	3.86784	317
980,000	5046.4	52.3	3.70298	452	1,430,000	7430.1	53.7	3.87099	315
990,000	5098.7	52.3	3.70746	448	1,440,000	7483.9	53.8	3.87413	314
1,000,000	5151.1	52.4	3.71190	444	1,450,000	7537.7	53.8	3.87724	311
1,010,000	5203.4	52.3	3.71629	439	1,460,000	7591.5	53.8	3.88033	309
1,020,000	5255.8	52.4	3.72064	435	1,470,000	7645.4	53.9	3.88340	307
1,030,000	5308.2	52.4	3.72495	431	1,480,000	7699.3	53.9	3.88645	305
1,040,000	5360.7	52.5	3.72922	427	1,490,000	7753.2	53.9	3.88948	303
1,050,000	5413.2	52.5	3.73345	423	1,500,000	7807.2	54.0	3.89250	302
1,060,000	5465.7	52.5	3.73765	420	1,510,000	7861.2	54.0	3.89549	299
1,070,000	5518.2	52.5	3.74180	415	1,520,000	7915.3	54.1	3.89847	298
1,080,000	5570.8	52.6	3.74592	412	1,530,000	7969.4	54.1	3.90143	296
1,090,000	5623.4	52.6	3.75000	408	1,540,000	8023.6	54.2	3.90437	294
1,100,000	5676.0	52.6	3.75404	404	1,550,000	8077.8	54.2	3.90729	292
1,110,000	5728.6	52.6	3.75805	401	1,560,000	8132.0	54.2	3.91020	291
1,120,000	5781.3	52.7	3.76203	398	1,570,000	8186.3	54.3	3.91309	289
1,130,000	5834.0	52.7	3.76597	394	1,580,000	8240.6	54.3	3.91596	287
1,140,000	5886.7	52.7	3.76987	390	1,590,000	8294.9	54.3	3.91881	285
1,150,000	5939.5	52.8	3.77375	388	1,600,000	8349.3	54.4	3.92165	284

Table 6. ~~Continued~~ Continued

Northings	Function XV	DIG.	Log XV	DIG.	Northings	Function XV	DIG.	Log XV	DIG.
1,600,000	0940.9	84.4	3.02165	224					
1,610,000	0948.9	84.6	3.02440	229	2,620,000	10604	89	4.03789	224
1,620,000	0953.9	84.6	3.02720	230	2,670,000	10631	87	4.03906	223
1,630,000	0958.9	84.6	3.03007	270	2,680,000	11018	87	4.04210	223
1,640,000	0957.4	84.6	3.03206	270	2,690,000	11078	87	4.04434	224
1,650,000	0952.0	84.6	3.03581	270	2,100,000	11132	87	4.04687	223
1,660,000	0970.7	84.7	3.03935	274	2,110,000	11189	87	4.04879	222
1,670,000	0971.4	84.7	3.04103	273	2,120,000	11246	87	4.05100	221
1,680,000	0978.2	84.8	3.04350	272	2,130,000	11303	87	4.05319	210
1,690,000	0981.0	84.8	3.04680	270	2,140,000	11361	89	4.05542	223
1,700,000	0998.9	84.9	3.04919	230	2,150,000	11418	87	4.05780	217
1,710,000	0980.8	84.9	3.05123	237	2,160,000	11475	87	4.05975	216
1,720,000	0995.7	84.9	3.05482	234	2,170,000	11533	89	4.06194	210
1,730,000	0990.7	85.0	3.05716	234	2,180,000	11590	87	4.06408	214
1,740,000	0918.7	85.0	3.05979	203	2,190,000	11648	89	4.06628	217
1,750,000	0917.0	85.1	3.06241	203	2,200,000	11706	87	4.06837	212
1,760,000	0926.0	85.2	3.06501	230	2,210,000	11763	89	4.07082	216
1,770,000	0931.2	85.2	3.06780	259	2,220,000	11821	89	4.07305	213
1,780,000	0930.4	85.2	3.07018	255	2,230,000	11879	89	4.07476	213
1,790,000	0939.7	85.3	3.07274	255	2,240,000	11937	89	4.07680	212
1,800,000	0947.0	85.3	3.07539	255	2,250,000	11995	89	4.07900	210
1,810,000	0952.4	85.4	3.07763	254	2,260,000	12053	89	4.08110	210
1,820,000	0957.9	85.5	3.08030	253	2,270,000	12111	89	4.08313	203
1,830,000	0913.4	85.5	3.08289	253	2,280,000	12169	89	4.08526	207
1,840,000	0935.9	85.5	3.08538	250	2,290,000	12227	89	4.08732	207
1,850,000	0924.5	85.6	3.08787	249	2,300,000	12285	89	4.08933	203
1,860,000	0950.1	85.6	3.09034	247	2,310,000	12344	89	4.09146	203
1,870,000	0935.8	85.7	3.09281	247	2,320,000	12402	89	4.09349	208
1,880,000	0931.0	85.8	3.09527	246	2,330,000	12461	89	4.09553	203
1,890,000	0947.4	85.8	3.09771	244	2,340,000	12519	89	4.09757	202
1,900,000	10009	85.9	4.00013	242	2,350,000	12578	89	4.09961	204
1,910,000	10089	86	4.00256	242	2,360,000	12636	89	4.10161	200
1,920,000	10113	86	4.00497	242	2,370,000	12695	89	4.10363	202
1,930,000	10171	86	4.00736	230	2,380,000	12754	89	4.10565	202
1,940,000	10227	86	4.00973	230	2,390,000	12813	89	4.10765	200
1,950,000	10283	86	4.01212	237	2,400,000	12872	89	4.10965	200
1,960,000	10339	86	4.01448	236	2,410,000	12931	89	4.11163	193
1,970,000	10303	87	4.01687	230	2,420,000	12990	89	4.11361	193
1,980,000	10452	86	4.01920	233	2,430,000	13049	89	4.11559	197
1,990,000	10508	86	4.02152	232	2,440,000	13109	89	4.11757	199
2,000,000	10565	87	4.02387	235	2,450,000	13168	89	4.11952	195
2,010,000	10621	86	4.02617	230	2,460,000	13228	89	4.12149	197
2,020,000	10678	87	4.02849	232	2,470,000	13287	89	4.12343	194
2,030,000	10734	86	4.03076	227	2,480,000	13347	89	4.12538	196
2,040,000	10791	87	4.03303	230	2,490,000	13406	89	4.12730	192
2,050,000	10848	87	4.03535	229	2,500,000	13466	89	4.12924	194

Table 6. Convergence—Continued

Northing	Function XV	Diff.	Log XV	Diff.	Northing	Function XV	Diff.	Log XV	Diff.
2,500,000	13466	60	4.12924	194					
2,510,000	13526	60	4.13117	193	2,960,000	16305	63	4.21232	168
2,520,000	13586	60	4.13309	192	2,970,000	16369	64	4.21402	170
2,530,000	13646	60	4.13501	192	2,980,000	16433	64	4.21572	170
2,540,000	13706	60	4.13691	190	2,990,000	16497	64	4.21740	168
2,550,000	13766	60	4.13881	190	3,000,000	16561	64	4.21909	169
2,560,000	13826	60	4.14070	189	3,010,000	16626	65	4.22079	170
2,570,000	13886	60	4.14258	188	3,020,000	16690	64	4.22246	167
2,580,000	13947	61	4.14448	190	3,030,000	16755	65	4.22414	168
2,590,000	14007	60	4.14635	187	3,040,000	16819	64	4.22580	166
2,600,000	14068	61	4.14823	188	3,050,000	16884	65	4.22748	168
2,610,000	14128	60	4.15008	185	3,060,000	16949	65	4.22914	166
2,620,000	14189	61	4.15195	187	3,070,000	17014	65	4.23081	167
2,630,000	14250	61	4.15381	186	3,080,000	17079	65	4.23246	165
2,640,000	14311	61	4.15567	186	3,090,000	17144	65	4.23411	165
2,650,000	14372	61	4.15752	185	3,100,000	17209	65	4.23576	165
2,660,000	14433	61	4.15936	184	3,110,000	17274	65	4.23739	163
2,670,000	14494	61	4.16119	183	3,120,000	17340	66	4.23905	166
2,680,000	14555	61	4.16301	182	3,130,000	17406	66	4.24070	165
2,690,000	14616	61	4.16483	182	3,140,000	17471	65	4.24232	162
2,700,000	14678	62	4.16667	184	3,150,000	17537	66	4.24396	164
2,710,000	14739	61	4.16847	180	3,160,000	17603	66	4.24559	163
2,720,000	14801	62	4.17029	182	3,170,000	17669	66	4.24721	162
2,730,000	14862	61	4.17208	179	3,180,000	17735	66	4.24883	162
2,740,000	14924	62	4.17389	181	3,190,000	17801	66	4.25044	161
2,750,000	14986	62	4.17569	180	3,200,000	17868	67	4.25208	164
2,760,000	15048	62	4.17748	179	3,210,000	17934	66	4.25368	160
2,770,000	15110	62	4.17926	178	3,220,000	18001	67	4.25530	162
2,780,000	15172	62	4.18104	178	3,230,000	18067	66	4.25689	159
2,790,000	15234	62	4.18281	177	3,240,000	18134	67	4.25849	160
2,800,000	15296	62	4.18458	177	3,250,000	18201	67	4.26010	161
2,810,000	15359	63	4.18636	178	3,260,000	18268	67	4.26169	159
2,820,000	15421	62	4.18811	175	3,270,000	18335	67	4.26328	159
2,830,000	15484	63	4.18988	177	3,280,000	18403	68	4.26489	161
2,840,000	15546	62	4.19162	174	3,290,000	18470	67	4.26647	158
2,850,000	15609	63	4.19338	176	3,300,000	18538	68	4.26806	159
2,860,000	15672	63	4.19512	174	3,310,000	18605	67	4.26963	157
2,870,000	15735	63	4.19687	175	3,320,000	18673	68	4.27121	158
2,880,000	15798	63	4.19860	173	3,330,000	18741	68	4.27279	158
2,890,000	15861	63	4.20033	173	3,340,000	18809	68	4.27437	158
2,900,000	15924	63	4.20205	172	3,350,000	18877	68	4.27593	156
2,910,000	15987	63	4.20377	172	3,360,000	18945	68	4.27749	156
2,920,000	16051	64	4.20550	173	3,370,000	19014	69	4.27907	158
2,930,000	16114	63	4.20720	170	3,380,000	19082	68	4.28062	155
2,940,000	16178	64	4.20892	172	3,390,000	19151	69	4.28219	157
2,950,000	16242	64	4.21064	172	3,400,000	19219	68	4.28373	154

Table 6. Convergence—Continued

Northing	Function XV	Diff.	Log XV	Diff.	Northing	Function XV	Diff.	Log XV	Diff.
3,400,000	19219	68	4.28373	154					
3,410,000	19288	69	4.28529	156	3,860,000	22532	75	4.35280	145
3,420,000	19357	69	4.28684	155	3,870,000	22608	76	4.35428	146
3,430,000	19427	70	4.28841	157	3,880,000	22683	75	4.35570	144
3,440,000	19496	69	4.28995	154	3,890,000	22759	76	4.35715	145
3,450,000	19565	69	4.29148	153	3,900,000	22835	76	4.35860	145
3,460,000	19635	70	4.29303	155	3,910,000	22911	76	4.36004	144
3,470,000	19704	69	4.29455	152	3,920,000	22988	77	4.36150	146
3,480,000	19774	70	4.29609	154	3,930,000	23064	76	4.36293	143
3,490,000	19844	70	4.29763	154	3,940,000	23141	77	4.36438	145
3,500,000	19914	70	4.29916	153	3,950,000	23218	77	4.36582	144
3,510,000	19984	70	4.30068	152	3,960,000	23295	77	4.36726	144
3,520,000	20055	71	4.30222	154	3,970,000	23372	77	4.36870	144
3,530,000	20125	70	4.30374	152	3,980,000	23450	78	4.37014	144
3,540,000	20196	71	4.30527	153	3,990,000	23527	77	4.37157	143
3,550,000	20267	71	4.30679	152	4,000,000	23605	78	4.37300	143
3,560,000	20337	70	4.30829	150	4,010,000	23683	78	4.37444	144
3,570,000	20408	71	4.30980	151	4,020,000	23761	78	4.37586	142
3,580,000	20480	72	4.31133	153	4,030,000	23840	79	4.37731	145
3,590,000	20551	71	4.31283	150	4,040,000	23918	78	4.37872	141
3,600,000	20622	71	4.31433	150	4,050,000	23997	79	4.38016	144
3,610,000	20694	72	4.31584	151	4,060,000	24076	79	4.38158	142
3,620,000	20766	72	4.31735	151	4,070,000	24155	79	4.38301	143
3,630,000	20837	71	4.31884	149	4,080,000	24234	79	4.38443	142
3,640,000	20909	72	4.32033	149	4,090,000	24313	79	4.38584	141
3,650,000	20982	73	4.32185	152	4,100,000	24393	80	4.38727	143
3,660,000	21054	72	4.32333	148	4,110,000	24473	80	4.38869	142
3,670,000	21126	72	4.32482	149	4,120,000	24553	80	4.39010	141
3,680,000	21199	73	4.32632	150	4,130,000	24633	80	4.39152	142
3,690,000	21272	73	4.32781	149	4,140,000	24713	80	4.39293	141
3,700,000	21345	73	4.32930	149	4,150,000	24794	81	4.39435	142
3,710,000	21418	73	4.33078	148	4,160,000	24874	80	4.39575	140
3,720,000	21491	73	4.33226	148	4,170,000	24955	81	4.39716	141
3,730,000	21564	73	4.33373	147	4,180,000	25036	81	4.39856	140
3,740,000	21638	74	4.33522	149	4,190,000	25118	82	4.39999	143
3,750,000	21711	73	4.33668	146	4,200,000	25199	81	4.40138	139
3,760,000	21785	74	4.33816	148	4,210,000	25281	82	4.40279	141
3,770,000	21859	74	4.33963	147	4,220,000	25363	82	4.40420	141
3,780,000	21933	74	4.34110	147	4,230,000	25445	82	4.40560	140
3,790,000	22008	75	4.34258	148	4,240,000	25527	82	4.40700	140
3,800,000	22082	74	4.34404	146	4,250,000	25610	83	4.40841	141
3,810,000	22157	75	4.34551	147	4,260,000	25692	82	4.40980	139
3,820,000	22231	74	4.34696	145	4,270,000	25775	83	4.41120	140
3,830,000	22306	75	4.34842	146	4,280,000	25859	84	4.41261	141
3,840,000	22381	75	4.34988	146	4,290,000	25942	83	4.41400	139
3,850,000	22457	76	4.35135	147	4,300,000	26025	83	4.41539	139

Table 6. Convergence—Continued

Northing	Function XV	Diff.	Log XV	Diff.	Northing	Function XV	Diff.	Log XV	Diff.
4,300,000	26025	83	4.41539	139					
4,310,000	26109	84	4.41679	140	4,700,000	30117	94	4.47881	136
4,320,000	26193	84	4.41810	140	4,770,000	30212	95	4.48018	137
4,330,000	26277	84	4.41958	139	4,780,000	30307	95	4.48154	136
4,340,000	26362	85	4.42008	140	4,790,000	30403	96	4.48292	138
4,350,000	26446	84	4.42236	138	4,800,000	30498	95	4.48427	135
4,360,000	26531	85	4.42375	139	4,810,000	30504	96	4.48564	137
4,370,000	26616	85	4.42514	139	4,820,000	30601	97	4.48701	137
4,380,000	26702	86	4.42654	140	4,830,000	30787	96	4.48837	136
4,390,000	26787	85	4.42792	138	4,840,000	30884	97	4.48973	136
4,400,000	26873	86	4.42932	140	4,850,000	30981	97	4.49110	137
4,410,000	26959	86	4.43070	138	4,860,000	31079	98	4.49247	137
4,420,000	27045	86	4.43209	139	4,870,000	31177	98	4.49383	136
4,430,000	27131	86	4.43347	138	4,880,000	31275	98	4.49520	137
4,440,000	27218	87	4.43486	139	4,890,000	31373	98	4.49656	136
4,450,000	27305	87	4.43624	138	4,900,000	31472	99	4.49792	136
4,460,000	27392	87	4.43762	138	4,910,000	31570	98	4.49927	135
4,470,000	27479	87	4.43900	138	4,920,000	31670	100	4.50065	138
4,480,000	27567	88	4.44039	139	4,930,000	31769	99	4.50200	135
4,490,000	27654	87	4.44176	137	4,940,000	31869	100	4.50337	137
4,500,000	27742	88	4.44314	138	4,950,000	31969	100	4.50473	136
4,510,000	27831	89	4.44453	139	4,960,000	32070	101	4.50610	137
4,520,000	27919	88	4.44590	137	4,970,000	32170	100	4.50745	135
4,530,000	28008	89	4.44728	138	4,980,000	32272	102	4.50883	138
4,540,000	28097	89	4.44866	138	4,990,000	32373	101	4.51018	135
4,550,000	28186	89	4.45003	137	5,000,000	32475	102	4.51155	137
4,560,000	28275	89	4.45140	137	5,010,000	32577	102	4.51291	136
4,570,000	28365	90	4.45278	138	5,020,000	32679	102	4.51427	136
4,580,000	28455	90	4.45416	138	5,030,000	32782	103	4.51564	137
4,590,000	28545	90	4.45553	137	5,040,000	32885	103	4.51700	136
4,600,000	28635	90	4.45690	137	5,050,000	32988	103	4.51836	136
4,610,000	28726	91	4.45828	138	5,060,000	33092	104	4.51972	136
4,620,000	28817	91	4.45965	137	5,070,000	33196	104	4.52109	137
4,630,000	28908	91	4.46102	137	5,080,000	33300	104	4.52244	135
4,640,000	29000	92	4.46240	138	5,090,000	33405	105	4.52381	137
4,650,000	29091	91	4.46376	136	5,100,000	33510	105	4.52517	136
4,660,000	29183	92	4.46513	137	5,110,000	33615	105	4.52653	136
4,670,000	29276	93	4.46651	138	5,120,000	33721	106	4.52790	137
4,680,000	29368	92	4.46787	136	5,130,000	33827	106	4.52926	136
4,690,000	29461	93	4.46925	138	5,140,000	33933	106	4.53062	136
4,700,000	29554	93	4.47062	137	5,150,000	34040	107	4.53199	137
4,710,000	29647	93	4.47198	136	5,160,000	34147	107	4.53335	136
4,720,000	29740	93	4.47334	136	5,170,000	34251	107	4.53471	136
4,730,000	29834	94	4.47471	137	5,180,000	34362	108	4.53608	137
4,740,000	29928	94	4.47608	137	5,190,000	34470	108	4.53744	136
4,750,000	30025	95	4.47745	137	5,200,000	34579	109	4.53881	137

Table 6. Convergence—Continued

Northing	Function XV	Diff.	Log XV	Diff.	Northing	Function XV	Diff.	Log XV	Diff.
5,200,000	34579	109	4.53881	137					
5,210,000	34688	109	4.54018	137	5,660,000	40006	128	4.60213	140
5,220,000	34797	110	4.54154	136	5,670,000	40134	128	4.60351	138
5,230,000	34907	110	4.54291	137	5,680,000	40263	129	4.60491	140
5,240,000	35017	110	4.54428	137	5,690,000	40393	130	4.60631	140
5,250,000	35127	110	4.54564	136	5,700,000	40523	130	4.60770	139
5,260,000	35238	111	4.54701	137	5,710,000	40653	130	4.60909	139
5,270,000	35349	111	4.54838	137	5,720,000	40784	131	4.61049	140
5,280,000	35460	111	4.54974	136	5,730,000	40916	132	4.61189	140
5,290,000	35572	112	4.55111	137	5,740,000	41048	132	4.61329	140
5,300,000	35684	112	4.55247	136	5,750,000	41181	133	4.61470	141
5,310,000	35797	113	4.55385	138	5,760,000	41314	133	4.61610	140
5,320,000	35910	113	4.55522	137	5,770,000	41447	133	4.61749	139
5,330,000	36023	113	4.55658	136	5,780,000	41582	135	4.61891	142
5,340,000	36137	114	4.55795	137	5,790,000	41716	134	4.62030	139
5,350,000	36252	115	4.55933	138	5,800,000	41852	136	4.62172	142
5,360,000	36366	114	4.56070	137	5,810,000	41988	136	4.62313	141
5,370,000	36481	115	4.56207	137	5,820,000	42124	136	4.62453	140
5,380,000	36597	116	4.56345	138	5,830,000	42261	137	4.62591	141
5,390,000	36712	115	4.56481	136	5,840,000	42398	137	4.62735	141
5,400,000	36829	117	4.56619	138	5,850,000	42537	139	4.62877	142
5,410,000	36945	116	4.56756	137	5,860,000	42675	138	4.63017	140
5,420,000	37062	117	4.56893	137	5,870,000	42814	139	4.63159	142
5,430,000	37180	118	4.57031	138	5,880,000	42954	140	4.63300	141
5,440,000	37298	118	4.57169	138	5,890,000	43095	141	4.63443	143
5,450,000	37416	118	4.57306	137	5,900,000	43236	141	4.63585	142
5,460,000	37535	119	4.57444	138	5,910,000	43377	141	4.63726	141
5,470,000	37654	119	4.57581	137	5,920,000	43519	142	4.63868	142
5,480,000	37774	120	4.57719	138	5,930,000	43662	143	4.64010	142
5,490,000	37894	120	4.57857	138	5,940,000	43805	143	4.64152	142
5,500,000	38015	121	4.57996	139	5,950,000	43950	145	4.64296	144
5,510,000	38136	121	4.58134	138	5,960,000	44094	144	4.64438	142
5,520,000	38257	121	4.58271	137	5,970,000	44239	145	4.64581	143
5,530,000	38379	122	4.58409	138	5,980,000	44385	146	4.64724	143
5,540,000	38501	122	4.58547	138	5,990,000	44532	147	4.64867	143
5,550,000	38624	123	4.58686	139	6,000,000	44679	147	4.65010	143
5,560,000	38747	123	4.58824	138	6,010,000	44826	147	4.65153	143
5,570,000	38871	124	4.58963	139	6,020,000	44975	149	4.65297	144
5,580,000	38995	124	4.59101	138	6,030,000	45124	149	4.65441	144
5,590,000	39120	125	4.59240	139	6,040,000	45274	150	4.65585	144
5,600,000	39245	125	4.59378	138	6,050,000	45424	150	4.65729	144
5,610,000	39370	125	4.59517	139	6,060,000	45575	151	4.65873	144
5,620,000	39496	126	4.59655	138	6,070,000	45727	152	4.66017	144
5,630,000	39623	127	4.59795	140	6,080,000	45879	152	4.66161	144
5,640,000	39750	127	4.59934	139	6,090,000	46032	153	4.66306	145
5,650,000	39878	128	4.60073	139	6,100,000	46186	154	4.66451	145

Table 6. Convergence—Continued

Northing	Function XV	Diff.	Log XV	Diff.	Northing	Function XV	Diff.	Log XV	Diff.
6,100,000	46186	154	4.66451	145					
6,110,000	46340	154	4.66596	145	6,560,000	54091	192	4.73313	155
6,120,000	46495	155	4.66741	145	6,570,000	54284	193	4.73467	154
6,130,000	46651	156	4.66886	145	6,580,000	54478	194	4.73622	155
6,140,000	46807	156	4.67031	145	6,590,000	54673	195	4.73777	155
6,150,000	46965	158	4.67177	146	6,600,000	54869	196	4.73933	156
6,160,000	47123	158	4.67323	146	6,610,000	55066	197	4.74088	155
6,170,000	47281	158	4.67469	146	6,620,000	55264	198	4.74244	156
6,180,000	47441	160	4.67615	146	6,630,000	55463	199	4.74400	156
6,190,000	47601	160	4.67762	147	6,640,000	55663	200	4.74557	157
6,200,000	47761	160	4.67907	145	6,650,000	55864	201	4.74713	156
6,210,000	47923	162	4.68054	147	6,660,000	56067	203	4.74871	158
6,220,000	48078	155	4.68195	141	6,670,000	56270	203	4.75028	157
6,230,000	48241	163	4.68342	147	6,680,000	56475	205	4.75186	158
6,240,000	48405	164	4.68489	147	6,690,000	56681	206	4.75344	158
6,250,000	48570	165	4.68637	148	6,700,000	56888	207	4.75502	158
6,260,000	48735	165	4.68784	147	6,710,000	57096	208	4.75661	159
6,270,000	48901	166	4.68932	148	6,720,000	57305	209	4.75819	158
6,280,000	49068	167	4.69080	148	6,730,000	57515	210	4.75978	159
6,290,000	49236	168	4.69228	148	6,740,000	57727	212	4.76138	160
6,300,000	49404	168	4.69376	148	6,750,000	57940	213	4.76298	160
6,310,000	49574	170	4.69525	149	6,760,000	58153	213	4.76457	159
6,320,000	49744	170	4.69674	149	6,770,000	58369	216	4.76618	161
6,330,000	49915	171	4.69823	149	6,780,000	58585	216	4.76779	161
6,340,000	50087	172	4.69973	150	6,790,000	58803	218	4.76940	161
6,350,000	50259	172	4.70121	148	6,800,000	59021	218	4.77101	161
6,360,000	50433	174	4.70271	150	6,810,000	59241	220	4.77262	161
6,370,000	50607	174	4.70421	150	6,820,000	59463	222	4.77425	163
6,380,000	50782	175	4.70571	150	6,830,000	59685	222	4.77587	162
6,390,000	50958	176	4.70721	150	6,840,000	59909	224	4.77749	162
6,400,000	51135	177	4.70872	151	6,850,000	60134	225	4.77912	163
6,410,000	51313	178	4.71023	151	6,860,000	60361	227	4.78076	164
6,420,000	51492	179	4.71174	151	6,870,000	60589	228	4.78239	163
6,430,000	51671	179	4.71325	151	6,880,000	60818	229	4.78403	164
6,440,000	51852	181	4.71477	152	6,890,000	61049	231	4.78568	165
6,450,000	52033	181	4.71628	151	6,900,000	61281	232	4.78733	165
6,460,000	52215	182	4.71780	152	6,910,000	61514	233	4.78897	164
6,470,000	52399	184	4.71932	152	6,920,000	61749	235	4.79063	166
6,480,000	52583	184	4.72085	153	6,930,000	61985	236	4.79229	166
6,490,000	52768	185	4.72237	152	6,940,000	62222	237	4.79394	165
6,500,000	52954	186	4.72390	153	6,950,000	62461	239	4.79561	167
6,510,000	53141	187	4.72543	153	6,960,000	62702	241	4.79728	167
6,520,000	53329	188	4.72696	153	6,970,000	62943	241	4.79895	167
6,530,000	53518	189	4.72850	151	6,980,000	63187	244	4.80063	168
6,540,000	53708	190	4.73004	154	6,990,000	63432	245	4.80231	168
6,550,000	53899	191	4.73158	154	7,000,000	63678	246	4.80399	168

Table 6. Convergence--Continued

Northing	Function XV	Diff.	Log XV	Diff.	Northing	Function XV	Diff.	Log XV	Diff.
7,000,000	63678	246	4.80399	168					
7,010,000	63926	248	4.80568	169	7,460,000	76953	336	4.88623	190
7,020,000	64175	249	4.80737	169	7,470,000	77292	339	4.88813	190
7,030,000	64426	251	4.80906	169	7,480,000	77633	341	4.89005	192
7,040,000	64679	253	4.81076	170	7,490,000	77977	344	4.89197	192
7,050,000	64933	254	4.81247	171	7,500,000	78324	347	4.89389	192
7,060,000	65189	256	4.81417	170	7,510,000	78673	349	4.89583	194
7,070,000	65446	257	4.81588	171	7,520,000	79025	352	4.89776	193
7,080,000	65705	259	4.81760	172	7,530,000	79380	355	4.89971	195
7,090,000	65966	261	4.81932	172	7,540,000	79737	357	4.90166	195
7,100,000	66228	262	4.82104	172	7,550,000	80097	360	4.90362	196
7,110,000	66492	264	4.82277	173	7,560,000	80460	363	4.90558	196
7,120,000	66758	266	4.82450	173	7,570,000	80826	366	4.90755	197
7,130,000	67025	267	4.82624	174	7,580,000	81195	369	4.90953	198
7,140,000	67295	270	4.82798	174	7,590,000	81566	371	4.91151	198
7,150,000	67566	271	4.82973	175	7,600,000	81941	375	4.91350	199
7,160,000	67838	272	4.83147	174	7,610,000	82318	377	4.91549	199
7,170,000	68113	275	4.83323	176	7,620,000	82699	381	4.91750	201
7,180,000	68389	276	4.83499	176	7,630,000	83082	383	4.91951	201
7,190,000	68667	278	4.83675	176	7,640,000	83469	387	4.92153	202
7,200,000	68947	280	4.83852	177	7,650,000	83859	390	4.92355	202
7,210,000	69229	282	4.84029	177	7,660,000	84252	393	4.92558	203
7,220,000	69513	284	4.84207	178	7,670,000	84648	396	4.92762	204
7,230,000	69799	286	4.84385	178	7,680,000	85048	400	4.92966	204
7,240,000	70087	288	4.84564	179	7,690,000	85450	402	4.93171	205
7,250,000	70376	289	4.84742	178	7,700,000	85857	407	4.93378	207
7,260,000	70668	292	4.84922	180	7,710,000	86266	409	4.93584	206
7,270,000	70962	294	4.85103	181	7,720,000	86679	413	4.93791	207
7,280,000	71257	295	4.85283	180	7,730,000	87096	417	4.94000	209
7,290,000	71555	298	4.85464	181	7,740,000	87516	420	4.94209	209
7,300,000	71855	300	4.85646	182	7,750,000	87939	423	4.94418	209
7,310,000	72157	302	4.85828	182	7,760,000	88367	428	4.94629	211
7,320,000	72461	304	4.86010	182	7,770,000	88797	430	4.94840	211
7,330,000	72767	306	4.86193	183	7,780,000	89232	435	4.95052	212
7,340,000	73075	308	4.86377	184	7,790,000	89670	438	4.95265	213
7,350,000	73386	311	4.86561	184	7,800,000	90113	443	4.95479	214
7,360,000	73698	312	4.86746	185	7,810,000	90559	446	4.95693	214
7,370,000	74013	315	4.86931	185	7,820,000	91009	450	4.95908	215
7,380,000	74330	317	4.87116	185	7,830,000	91463	454	4.96125	217
7,390,000	74650	320	4.87303	187	7,840,000	91921	458	4.96341	216
7,400,000	74972	322	4.87490	187	7,850,000	92383	462	4.96550	218
7,410,000	75296	324	4.87677	187	7,860,000	92849	466	4.96778	219
7,420,000	75623	327	4.87865	188	7,870,000	93320	471	4.96997	219
7,430,000	75952	329	4.88054	189	7,880,000	93795	475	4.97218	221
7,440,000	76283	331	4.88243	189	7,890,000	94274	479	4.97439	221
7,450,000	76617	334	4.88433	190	7,900,000	94758	484	4.97662	223

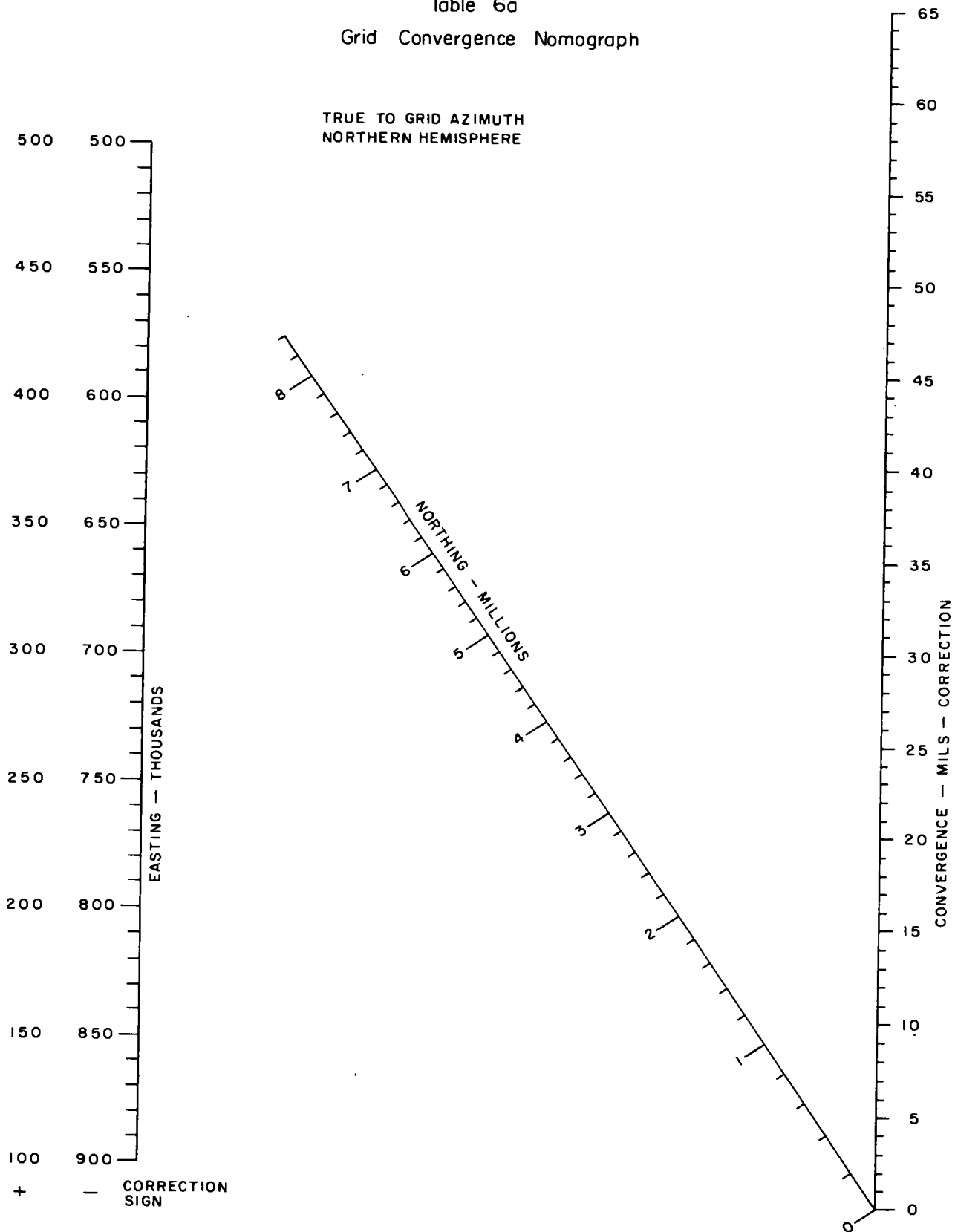
Table 6. Convergence—Continued

Northing	Function XV	Diff.	Log XV	Diff.	Northing	Function XV	Diff.	Log XV	Diff.
7,900,000	94758	484	4.97662	223					
7,910,000	95246	488	4.97885	223	8,360,000	123153	782	5.090445	2766
7,920,000	95738	492	4.98108	223	8,370,000	123943	790	5.093222	2777
7,930,000	96235	497	4.98333	225	8,380,000	124743	800	5.096016	2794
7,940,000	96737	502	4.98559	226	8,390,000	125553	810	5.098827	2811
7,950,000	97244	507	4.98786	227	8,400,000	126372	819	5.101651	2824
7,960,000	97755	511	4.99014	228	8,410,000	127202	830	5.104494	2843
7,970,000	98271	516	4.99243	229	8,420,000	128042	840	5.107352	2858
7,980,000	98792	521	4.99472	229	8,430,000	128893	851	5.110229	2877
7,990,000	99318	526	4.99703	231	8,440,000	129754	861	5.113121	2892
8,000,000	99850	532	4.99935	232	8,450,000	130626	872	5.116030	2909
8,010,000	100386	536	5.001673	2323	8,460,000	131510	884	5.118959	2929
8,020,000	100928	542	5.004012	2339	8,470,000	132404	894	5.121901	2942
8,030,000	101475	547	5.006359	2347	8,480,000	133310	906	5.124863	2962
8,040,000	102027	552	5.008715	2356	8,490,000	134228	918	5.127843	2980
8,050,000	102585	558	5.011084	2369	8,500,000	135158	930	5.130842	2999
8,060,000	103149	564	5.013465	2381	8,510,000	136101	943	5.133861	3019
8,070,000	103718	569	5.015854	2389	8,520,000	137055	954	5.136895	3034
8,080,000	104293	575	5.018255	2401	8,530,000	138023	968	5.139951	3056
8,090,000	104873	580	5.020664	2409	8,540,000	139003	980	5.143024	3073
8,100,000	105460	587	5.023088	2424	8,550,000	139997	994	5.146119	3095
8,110,000	106053	593	5.025523	2435	8,560,000	141005	1008	5.149235	3116
8,120,000	106651	598	5.027965	2442	8,570,000	142026	1021	5.152368	3133
8,130,000	107256	605	5.030422	2457	8,580,000	143062	1036	5.155524	3156
8,140,000	107868	612	5.032893	2471	8,590,000	144112	1050	5.158700	3176
8,150,000	108486	618	5.035374	2481	8,600,000	145176	1064	5.161895	3195
8,160,000	109110	624	5.037865	2491	8,610,000	146250	1080	5.165114	3219
8,170,000	109741	631	5.040369	2504	8,620,000	147351	1095	5.168353	3239
8,180,000	110379	638	5.042886	2517	8,630,000	148462	1111	5.171615	3262
8,190,000	111023	644	5.045413	2527	8,640,000	149590	1128	5.174903	3288
8,200,000	111675	652	5.047956	2543	8,650,000	150733	1143	5.178208	3305
8,210,000	112333	658	5.050507	2551	8,660,000	151894	1161	5.181541	3333
8,220,000	112999	666	5.053075	2568	8,670,000	153071	1177	5.184893	3352
8,230,000	113672	673	5.055654	2579	8,680,000	154267	1196	5.188273	3380
8,240,000	114353	681	5.058248	2594	8,690,000	155480	1213	5.191675	3402
8,250,000	115041	688	5.060853	2605	8,700,000	156712	1232	5.195102	3427
8,260,000	115737	696	5.063472	2619	8,710,000	157962	1250	5.198553	3451
8,270,000	116441	704	5.066106	2634	8,720,000	159232	1270	5.202030	3477
8,280,000	117153	712	5.068753	2647	8,730,000	160522	1290	5.205535	3505
8,290,000	117873	720	5.071414	2661	8,740,000	161831	1309	5.209062	3527
8,300,000	118601	728	5.074088	2674	8,750,000	163162	1331	5.212619	3557
8,310,000	119338	737	5.076779	2691	8,760,000	164514	1352	5.216203	3584
8,320,000	120083	745	5.079482	2703	8,770,000	165887	1373	5.219812	3609
8,330,000	120837	754	5.082200	2718	8,780,000	167283	1396	5.223452	3640
8,340,000	121600	763	5.084931	2734	8,790,000	168702	1419	5.227120	3668
8,350,000	122371	771	5.087679	2745	8,800,000	170144	1442	5.230817	3697

Table 6. Convergence—Continued

Northing	Function XV	Diff.	Log XV	Diff.	Northing	Function XV	Diff.	Log XV	Diff.
8,800,000	170144	1442	5.230817	3697					
8,810,000	171610	1400	5.234543	3726	8,860,000	179322	1506	5.253034	3883
8,820,000	173100	1400	5.238297	3754	8,870,000	180945	1023	5.257547	3913
8,830,000	174616	1516	5.242084	3787	8,880,000	182597	1652	5.261404	3947
8,840,000	176158	1542	5.245902	3818	8,890,000	184279	1082	5.265470	3982
8,850,000	177726	1568	5.249751	3840	8,900,000	185991	1712	5.269492	4016

Table 6a
Grid Convergence Nomograph



FOR SOUTHERN HEMISPHERE, SUBTRACT NORTHING FROM 10,000,000
USE OPPOSITE SIGN OF CORRECTION

Table 7. Second Term in Convergence Computation, UTM Coordinates

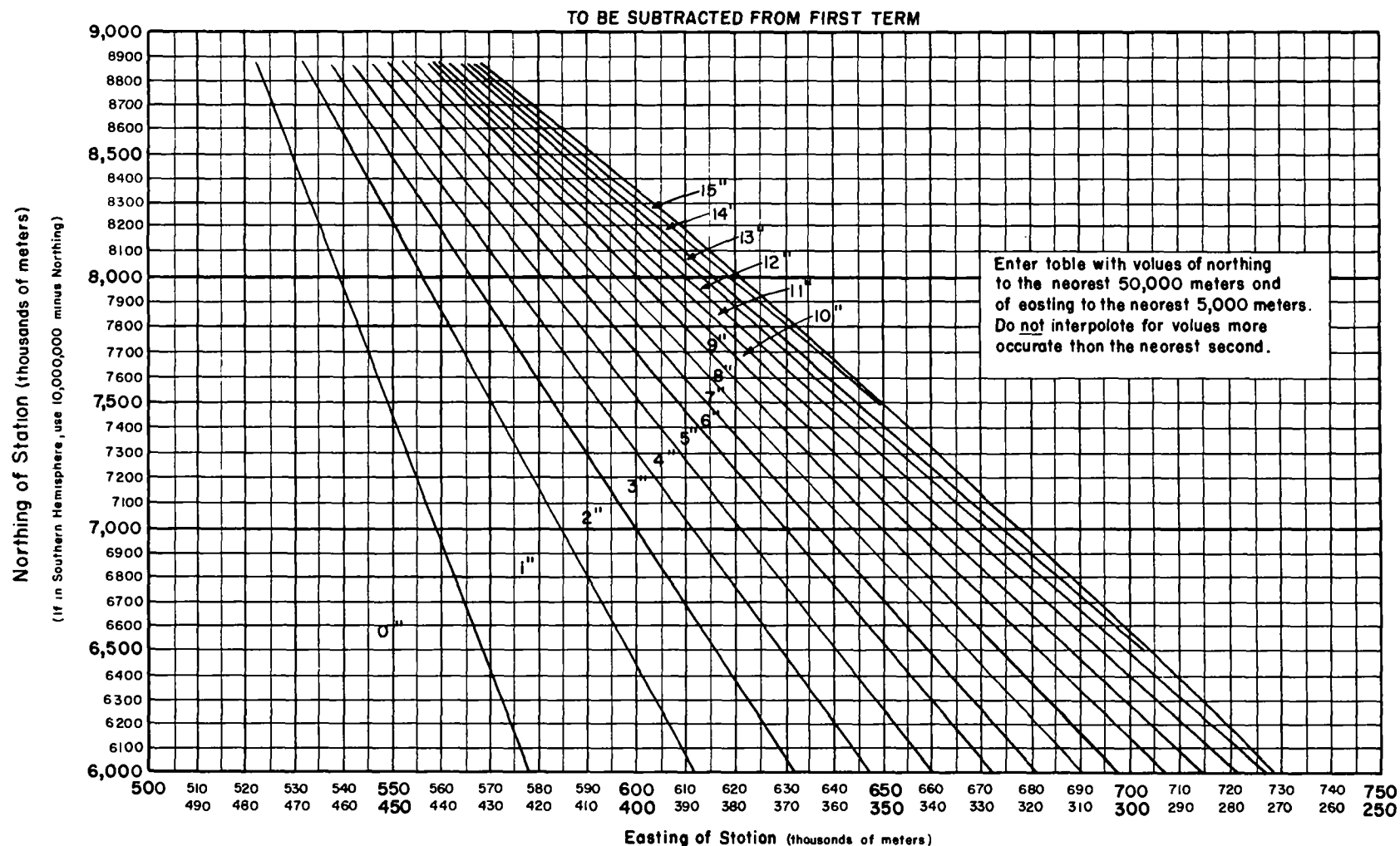
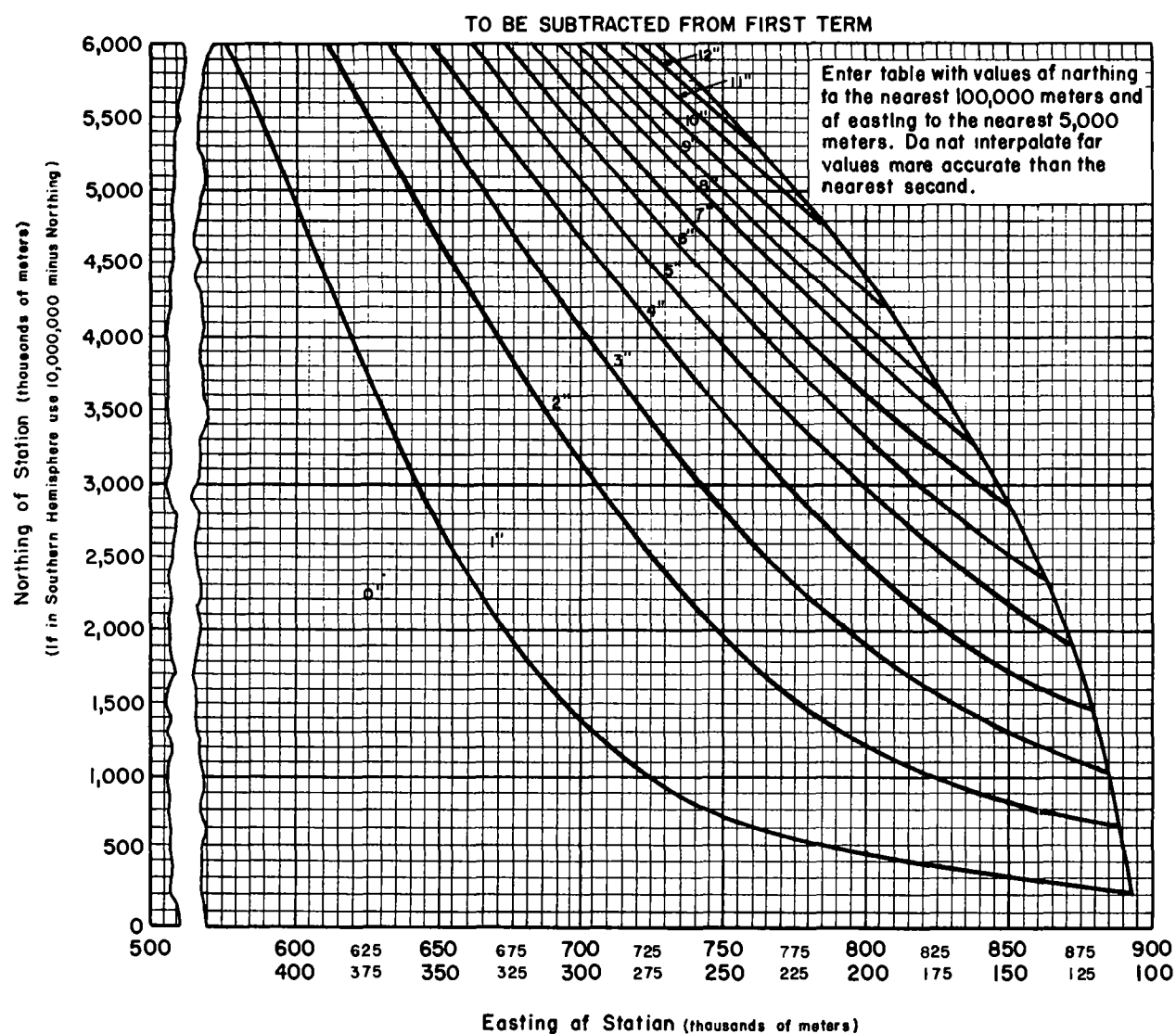


Table 7. Second Term in Convergence Computation, UTM Coordinates --Continued



CONVERSION TABLE	
1"	0.00 m
2"	0.01 m
3"	0.01 m
4"	0.02 m
5"	0.02 m
6"	0.03 m
7"	0.03 m
8"	0.04 m
9"	0.04 m
10"	0.05 m
11"	0.05 m
12"	0.06 m
13"	0.06 m
14"	0.07 m
15"	0.07 m

Table 8a. Second Term in Convergenge Computation, Geographic Coordinates (Degrees)

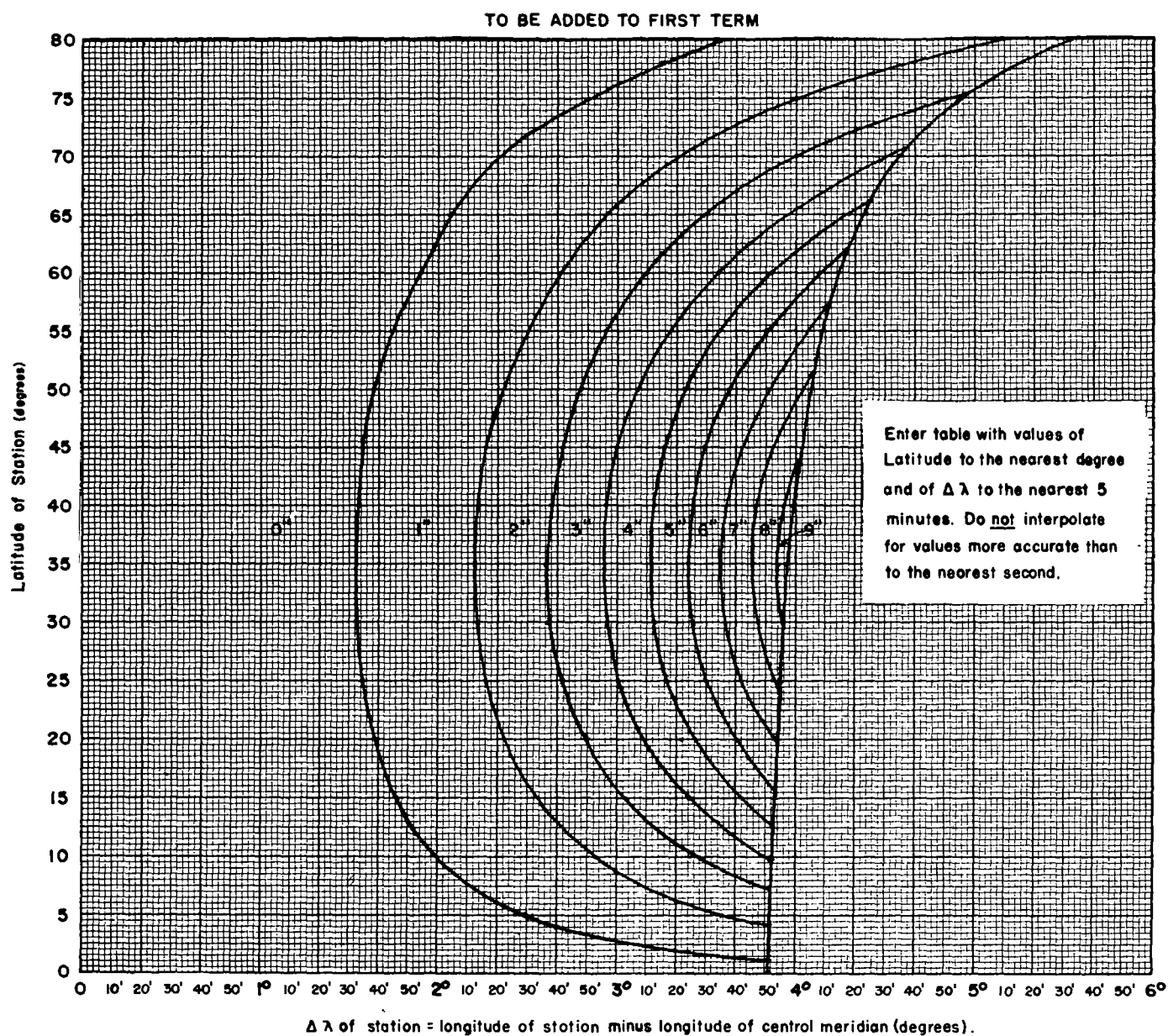


Table 8b. Second Term in Convergence Computation, Geographic Coordinates (Mils)
TO BE ADDED TO FIRST TERM

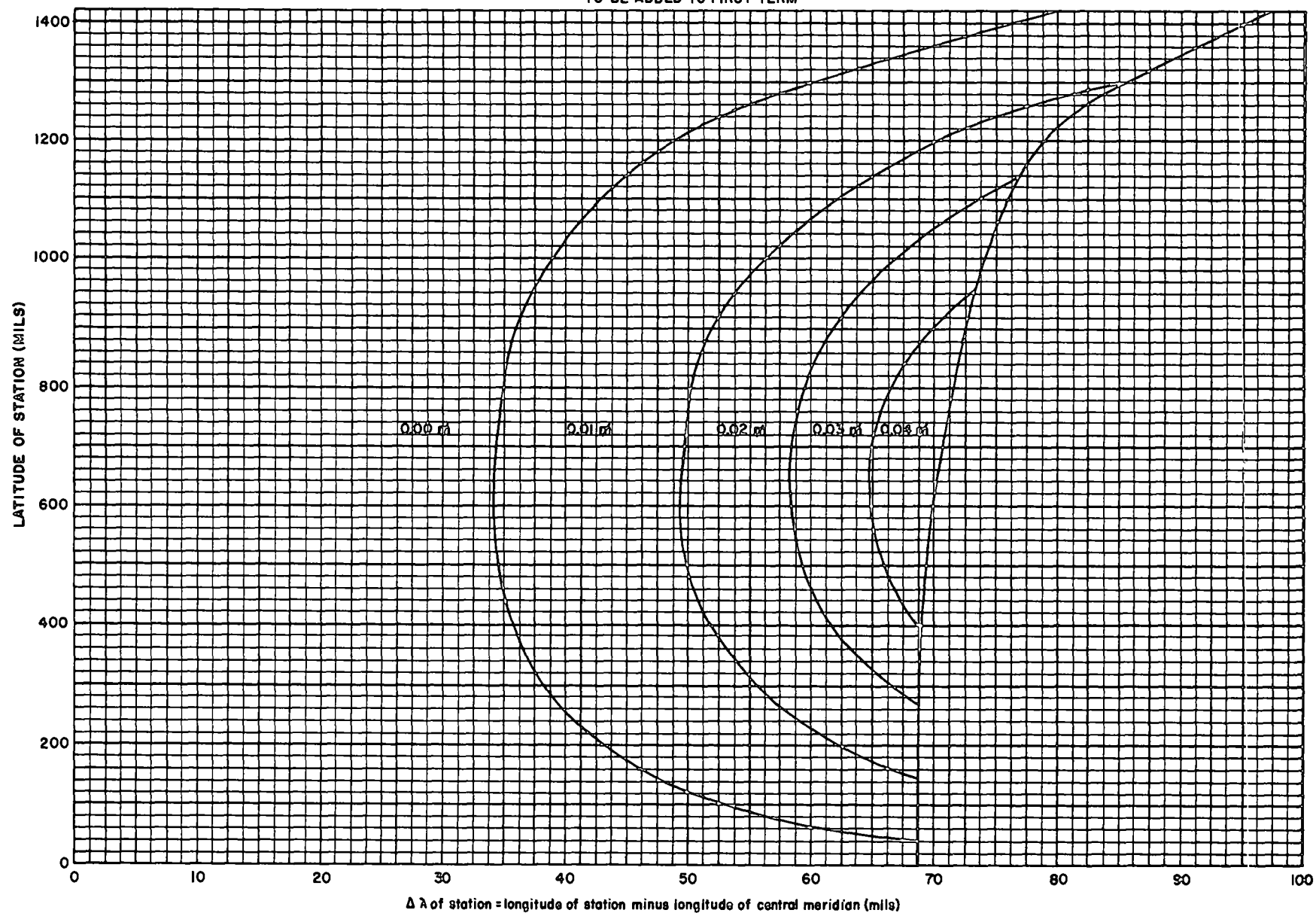


Table 9. Alphabetical Star List

Enter table with name of star to obtain the number for use in entering table 10a, 10b, or 11.

Star	Constellation	No.	Magnitude
Acamar, Theta (θ) Eridani	Eridanus	12	3.4
Achernar, Alpha (α) Eridani	Eridanus	9	0.6
Acrux, Alpha (α) Crucis	Crux	42	1.0
Adhara, Epsilon (ϵ) Canis Majoris	Canis Major	26	1.6
Aldebaran, Alpha (α) Tauri	Taurus	15	1.1
Alhena, Gamma (γ) Geminorum*	Gemini	24	1.9
Alioth, Epsilon (ϵ) Ursae Majoris	Ursa Major	45	1.7
Alkaid, (Benetnasch), Eta (η) Ursae Majoris	Ursa Major	48	1.9
Al Na'ir, Alpha (α) Gruis	Crus	71	2.2
Alnilam, Epsilon (ϵ) Orionis	Orion	20	1.7
Alnitak, Zeta (ζ) Orionis*	Orion	21	2.0
Alpha (α) Ceti, Menkar**	Cetus	13	2.8
Alpha (α) Persei, Mirfak	Perseus	14	1.9
Alpha (α) Tri Aust, Atria	Triangulum Australe	58	1.9
Alphard, Alpha (α) Hydrae	Hydra	35	2.2
Alphecca, Alpha (α) Coronae Bor.	Corona Borealis	55	2.3
Alpheratz, Alpha (α) Andromedae	Andromeda	1	2.1
(Al Suhail), Suhail, Lambda (λ) Velorum	Vela (Argo)	33	2.2
Altair, Alpha (α) Aquilae	Aquila	66	0.9
Ankaa, Alpha (α) Phoenix**	Phoenix	4	2.4
Antares, Alpha (α) Scorpii	Scorpius	57	1.2
Arcturus, Alpha (α) Bootis	Bootes	51	0.2
Atria, Alpha (α) Tri Aust	Triangulum Australe	58	1.9
Avior, Epsilon (ϵ) Carinae	Carina (Argo, Vela)	32	1.7
Bellatrix, Gamma (γ) Orionis	Orion	18	1.7
Beta (β) Centauri, Hadar	Centaurus	49	0.9
Beta (β) Crucis, Mimosas*	Crux	44	1.5
Beta (β) Hydri***	Hydra	3	2.9
Betelgeuse, (Betelgeux), Alpha (α) Orionis	Orion	22	0.1
Canopus, Alpha (α) Carinae	Carina (Argo, Vela)	23	-0.6
Capella, Alpha (α) Aurigae	Auriga	17	0.2
Caph, Beta (β) Cassiopeiae*	Cassiopeia	2	2.4
Castor, Alpha (α) Geminorum*	Gemini	28	1.6
Delta (δ) Canis Majoris, Wezen*	Canis Major	27	2.0
Deneb, Alpha (α) Cygni	Cygnus	68	1.3
Denebola, Beta (β) Leonis	Leo	39	2.2
Diphda, (Deneb Kaitos), Beta (β) Ceti	Cetus	6	2.2
Dschubba, Delta (δ) Scorpii**	Scorpius	56	2.5
Dubhe, Alpha (α) Ursae Majoris	Ursa Major	38	1.9
Elnath, (El Nath), Beta (β) Tauri	Taurus	19	1.8
Eltanin, (Eltamin), Gamma (γ) Draconis	Draco	62	2.4
Enif, Epsilon (ϵ) Pegasi	Pegasus	70	2.5
Epsilon (ϵ) Carinae, Avior	Carina (Argo, Vela)	32	1.7
Fomalhaut, Alpha (α) Piscis Austrini	Piscis Austrinus	72	1.3
Gacrux, Gamma (γ) Crucis	Crux	43	1.6
Gamma (γ) Cassiopeiae*	Cassiopeia	7	1.6-2.8
Gamma (γ) Velorum, (Gamma Argus)*	Vela (Argo)	31	1.9
Gamma (γ) Geminorum, Alhena*	Gemini	24	1.9
Gienah, Gamma (γ) Corvi**	Corvus	41	2.8
Hadar, Beta (β) Centauri	Centaurus	49	0.9
Hamal, Alpha (α) Arietis	Aries	11	2.2
Kaus Australis, Epsilon (ϵ) Sagittarii	Sagitta	63	1.9
Kochab, Beta (β) Ursae Minoris	Ursa Minor	54	2.2
Markab, Alpha (α) Pegasi	Pegasus	73	2.6
Menkar, Alpha (α) Ceti**	Cetus	13	2.8
Menkent, Theta (θ) Centauri	Centaurus	50	2.3
Merak, Beta (β) Ursae Majoris*	Ursa Major	37	2.4

Table 9. Alphabetical Star List—Continued

Star	Constellation	No.	Magnitude
Miaplacidus, Beta (β) Carinae.....	Carina (Argo).....	34	1.8
Mimosa, Beta (β) Crucis*.....	Crux.....	44	1.5
Mirfak, (Marfak), Alpha (α) Persei.....	Perseus.....	14	1.9
Mizar, Zeta (ζ) Ursae Majoris*.....	Ursa Major.....	46	2.4
Nunki, Sigma (σ) Sagittarii.....	Sagitta.....	65	2.1
(Octantis), Nu (ν) Octantis***.....	Octans.....	69	3.7
Peacock, Alpha (α) Pavonis.....	Pavo.....	67	2.1
Phecda, Gamma (γ) Ursae Majoris*.....	Ursa Major.....	40	2.5
Polaris, Alpha (α) Ursae Minoris***.....	Ursa Minor.....	10	2.1
Pollux, Beta (β) Geminorum.....	Gemini.....	30	1.2
Procyon, Alpha (α) Canis Minoris.....	Canis Minor.....	29	0.5
Rasalhague, Alpha (α) Ophiuchi.....	Ophiuchus.....	61	2.1
Regulus, Alpha (α) Leonis.....	Leo.....	36	1.3
Rigel, Beta (β) Orionis.....	Orion.....	16	0.3
Rigil Kentaurus, Alpha (α) Centauri.....	Centaurus.....	52	0.1
Ruchbah, Delta (δ) Cassiopeiae*.....	Cassiopeia.....	8	2.8
Sabik, Eta (η) Ophiuchi.....	Ophiuchus.....	59	2.6
Scaula, (Shaula), Lambda (λ) Scorpii.....	Scorpius.....	60	1.7
Schedar, (Schedir), Alpha (α) Cassiopeiae.....	Cassiopeia.....	5	2.3
Sirius, Alpha (α) Canis Majoris.....	Canis Major.....	25	-1.6
Spica, Alpha (α) Virginis.....	Virgo.....	47	1.2
Suhail, (Al Suhail), Lambda (λ) Velorum.....	Vela (Argo).....	33	2.2
Theta (θ) Centauri, Menkent.....	Centaurus.....	50	2.3
Vega, Alpha (α) Lyrae.....	Lyra.....	64	0.1
Wezen, Delta (δ) Canis Majoris*.....	Canis Major.....	27	2.0
Zeta (ζ) Orionis, Alnitak*.....	Orion.....	21	2.0
Zebenelgenubi, Alpha (α) Librae**.....	Libra.....	53	2.9

Note. Sirius (magnitude—1.6) is the brightest star listed, Octantis (magnitude 3.7) is the dimmest star listed. Brightness of other stars listed is indicated by their magnitude.

Spelled out names in parentheses are names sometimes used but not recommended.

- * Indicates star not on identifier 2012D.
- ** Indicates star not on identifier 2012C.
- *** Indicates star not on either identifier.

The constellation Argus has been replaced by its three modern divisions Carina, Puppis, and Vela.

Table 10a. Apparent Places of Stars, 1975 (Degrees)

STAR NO.	Right ascension Declination	(Hr Min) (° ')	Zero hours universal time (GMT) of first day of month												
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
			Seconds (time of RA; arc of DEC)												
1	RA DEC	0 7 28 57	6.4 24	6.0 20	5.8 16	5.9 11	6.4 10	7.3 11	8.3 16	9.3 23	9.9 31	10.2 37	10.2 42	9.9 44	9.5 43
2	RA DEC	0 7 59 0	51.1 66	50.2 62	49.7 55	49.7 47	50.5 41	51.9 39	53.4 42	54.9 49	55.9 59	56.2 69	56.0 78	55.4 84	54.5 85
3	RA DEC	0 24 -77 23	27.1 56	24.5 51	22.9 43	22.5 31	23.5 20	25.8 11	28.7 6	31.8 7	34.2 12	35.1 21	34.2 30	32.1 36	29.2 37
4	RA DEC	0 25 -42 25	3.7 99	3.2 97	2.8 92	2.8 84	3.2 75	4.1 66	5.2 60	6.3 58	7.1 60	7.5 65	7.4 72	6.9 78	6.4 81
5	RA DEC	0 39 56 23	6.2 84	5.3 81	4.7 75	4.6 67	5.2 61	6.4 59	7.8 60	9.3 67	10.4 76	10.9 85	10.9 94	10.5 100	9.7 102
6	RA DEC	0 42 -18 6	21.0 87	20.6 88	20.4 86	20.3 82	20.7 76	21.4 69	22.3 63	23.2 58	24.0 56	24.4 58	24.4 62	24.2 66	23.8 69
7	RA DEC	0 55 60 34	13.0 77	12.0 75	11.2 69	11.0 61	11.5 54	12.8 51	14.4 52	16.0 57	17.3 66	18.0 75	18.1 85	17.6 92	16.8 95
8	RA DEC	1 24 60 6	12.2 43	11.2 42	10.4 37	10.0 29	10.4 22	11.5 18	13.0 18	14.7 22	16.1 30	17.0 39	17.2 49	17.0 56	16.3 60
9	RA DEC	1 36 -57 21	48.2 61	47.1 61	46.3 56	45.7 47	45.8 37	46.5 26	47.7 19	49.1 15	50.4 17	51.2 23	51.3 32	50.9 40	50.0 45

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See Table 11. Apparent Places of Polaris, 1975

11	RA DEC	2 5 23 20	47.3 52	46.9 50	46.5 47	46.2 44	46.4 43	46.9 43	47.8 46	48.8 51	49.7 56	50.4 61	50.7 64	50.8 66	50.6 66
12	RA DEC	2 57 -40 23	20.4 85	19.7 89	19.1 88	18.5 83	18.3 75	18.6 65	19.3 56	20.3 50	21.4 48	22.2 51	22.7 58	22.7 66	22.4 74
13	RA DEC	3 0 3 59	60.1 35	59.7 33	59.3 31	58.9 31	58.8 33	59.2 36	59.9 41	60.8 46	61.7 50	62.4 51	62.9 51	63.1 49	63.0 46
14	RA DEC	3 22 49 46	34.8 37	34.2 39	33.4 37	32.8 33	32.6 27	33.0 23	34.0 20	35.3 21	36.7 24	37.8 30	38.6 36	39.0 42	38.9 47
15	RA DEC	4 34 16 27	31.4 37	31.2 36	30.7 35	30.2 34	29.9 34	30.1 34	30.6 36	31.4 39	32.3 41	33.2 43	34.0 43	34.5 42	34.7 41
16	RA DEC	5 13 -8 13	22.3 51	22.2 55	21.7 58	21.2 58	20.8 56	20.7 51	21.1 46	21.7 40	22.6 37	23.5 36	24.2 39	24.8 44	25.0 50
17	RA DEC	5 14 45 58	53.7 29	53.5 33	52.9 34	52.1 33	51.6 30	51.6 25	52.1 21	53.1 19	54.3 18	55.5 19	56.7 22	57.5 26	57.9 30
18	RA DEC	5 23 6 19	49.7 38	49.6 36	49.2 34	48.6 34	48.3 35	48.2 37	48.6 40	49.2 43	50.1 45	51.0 46	51.8 45	52.4 42	52.7 38
19	RA DEC	5 24 28 35	45.3 15	45.2 16	44.8 16	44.2 15	43.8 14	43.7 12	44.1 11	44.9 11	45.9 12	46.9 13	47.8 13	48.5 14	48.9 15

Table 10a. Apparent Places of Stars, 1975 (Degrees) — Continued

STAR NO.	Right ascension Declination	(Hr Min) (° ')	Zero hours universal time (GMT) of first day of month												
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
			Seconds (time of RA; arc of DEC)												
20	RA DEC	5 34 -1 12	58.9 65	58.8 69	58.4 71	57.9 71	57.5 70	57.4 66	57.7 62	58.3 58	59.2 55	60.0 54	60.8 57	61.4 61	61.8 66
21	RA DEC	5 39 -1 57	32.1 22	32.0 26	31.6 28	31.1 28	30.7 27	30.6 23	30.9 19	31.5 15	32.3 12	33.2 11	34.0 13	34.6 18	35.0 23
22	RA DEC	5 53 7 24	51.5 9	51.4 6	51.1 5	50.5 4	50.1 5	50.0 7	50.3 9	50.9 12	51.7 14	52.6 15	53.4 13	54.1 10	54.5 6
23	RA DEC	6 23 -52 40	26.5 60	26.2 70	25.5 76	24.4 78	23.4 75	22.8 68	22.7 59	23.2 49	24.1 42	25.3 40	26.5 44	27.4 53	27.8 64
24	RA DEC	6 36 16 25	18.6 13	18.7 12	18.4 11	17.9 11	17.4 11	17.2 12	17.4 13	17.9 13	18.7 14	19.5 13	20.5 12	21.3 9	21.8 7
25	RA DEC	6 44 -16 40	4.9 59	4.9 66	4.6 70	4.0 72	3.5 70	3.2 66	3.3 60	3.7 55	4.4 50	5.3 49	6.2 52	6.9 59	7.4 67
26	RA DEC	6 57 -28 56	40.9 20	41.0 28	40.6 34	39.9 36	39.3 35	38.9 30	38.9 23	39.3 15	40.0 9	40.8 7	41.8 10	42.6 17	43.2 27
27	RA DEC	7 7 -26 21	24.8 15	24.9 23	24.5 29	23.9 32	23.3 30	23.0 26	22.9 19	23.2 12	23.9 6	24.7 4	25.7 7	26.5 14	27.1 23
28	RA DEC	7 33 31 56	3.0 31	3.3 32	3.2 34	2.6 36	2.0 36	1.7 35	1.7 33	2.1 31	2.8 28	3.7 25	4.8 23	5.8 21	6.6 21
29	RA DEC	7 38 5 17	2.0 16	2.3 12	2.1 10	1.7 10	1.2 10	0.9 12	0.9 14	1.2 16	1.8 17	2.5 17	3.4 14	4.3 9	5.0 4
30	RA DEC	7 43 28 4	49.9 66	50.2 67	50.1 68	49.6 70	49.0 70	48.7 70	48.6 69	49.0 67	49.6 64	50.5 61	51.5 59	52.5 56	53.3 55
31	RA DEC	8 8 -47 15	48.3 46	48.6 57	48.2 66	47.5 72	46.7 73	45.9 69	45.5 63	45.6 54	46.1 46	47.0 41	48.2 42	49.3 48	50.1 59
32	RA DEC	8 21 -59 25	63.2 43	63.5 55	63.1 64	62.0 71	60.9 74	59.8 71	59.1 64	59.0 55	59.5 46	60.6 40	62.0 40	63.5 46	64.5 56
33	RA DEC	9 7 -43 19	6.9 52	7.4 62	7.4 71	6.9 79	6.2 81	5.5 80	5.0 75	4.9 67	5.2 59	5.9 54	6.9 53	8.1 58	9.1 67
34	RA DEC	9 12 -69 36	59.8 47	60.5 58	60.2 69	59.0 78	57.4 83	55.6 83	54.3 78	53.6 69	53.8 60	55.0 53	56.9 50	59.1 53	60.8 62
35	RA DEC	9 26 -8 33	23.5 6	24.1 12	24.2 17	23.9 19	23.5 20	23.1 18	22.9 15	22.9 11	23.1 9	23.7 8	24.5 10	25.4 15	26.3 22
36	RA DEC	10 7 12 4	4.3 71	5.1 68	5.3 67	5.2 67	4.8 69	4.4 71	4.1 72	4.0 73	4.2 72	4.6 69	5.4 65	6.3 59	7.3 54
37	RA DEC	11 0 56 30	22.4 36	23.6 38	24.3 44	24.2 51	23.6 57	22.7 61	21.9 60	21.4 55	21.3 47	21.6 37	22.5 28	23.9 21	25.5 17

Table 10a. Apparent Places of Stars, 1975 (Degrees) — Continued

STAR NO.	Right ascension Declination	(Hr Min) (° ')	Zero hours universal time (GMT) of first day of month												
			Jan	Feb	Mor	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
			Seconds (time of RA; arc of DEC)												
38	RA	11 2	13.8	15.2	15.9	15.8	15.1	14.0	13.1	12.3	12.2	12.6	13.6	15.1	16.9
	DEC	61 52	46	48	54	62	69	72	71	65	57	47	37	30	27
39	RA	11 47	48.3	49.3	49.8	50.0	49.8	49.5	49.2	48.9	48.7	48.9	49.3	50.1	51.2
	DEC	14 42	29	25	24	25	28	30	33	33	32	29	23	17	10
40	RA	11 52	32.4	33.8	34.6	34.8	34.4	33.7	32.9	32.2	31.9	32.0	32.6	33.7	35.1
	DEC	53 49	38	37	42	49	56	61	62	59	52	43	33	24	19
41	RA	12 14	32.3	33.2	33.8	34.1	34.1	33.8	33.5	33.1	32.9	33.0	33.4	34.2	35.2
	DEC	-17 24	13	20	26	31	33	34	32	29	26	24	23	26	32
42	RA	12 25	13.5	15.2	16.3	16.8	16.7	16.0	15.0	14.0	13.2	13.1	13.7	15.1	17.0
	DEC	-62 57	27	34	43	54	63	69	71	68	62	54	46	43	45
43	RA	12 29	47.7	49.2	50.1	50.6	50.6	50.1	49.3	48.5	47.9	47.7	48.3	49.5	51.1
	DEC	-56 58	14	21	30	40	49	54	56	53	47	39	33	30	32
44	RA	12 46	16.4	18.0	19.1	19.7	19.8	19.3	18.5	17.6	16.8	16.6	17.1	18.3	20.0
	DEC	-59 32	57	63	72	82	91	98	100	98	92	84	77	73	75
45	RA	12 52	56.3	57.8	58.8	59.3	59.2	58.6	57.8	56.9	56.2	55.9	56.2	57.1	58.5
	DEC	56 5	20	18	21	28	36	43	46	45	39	30	19	9	2
46	RA	13 22	55.2	56.7	57.8	58.4	58.4	58.0	57.2	56.3	55.5	55.1	55.2	55.9	57.2
	DEC	55 2	58	55	57	64	72	80	84	84	79	70	60	49	41
47	RA	13 23	53.2	54.2	54.9	55.4	55.6	55.5	55.3	54.9	54.6	54.4	54.6	55.2	56.2
	DEC	-11 1	55	61	66	69	70	70	68	66	64	63	63	66	72
48	RA	13 46	33.2	34.6	35.6	36.3	36.4	36.1	35.6	34.8	34.1	33.6	33.6	34.1	35.3
	DEC	49 25	55	51	52	58	66	74	79	80	76	69	59	49	40
49	RA	14 2	3.5	5.3	6.7	7.8	8.3	8.2	7.7	6.7	5.8	5.2	5.2	6.1	7.8
	DEC	-60 14	59	63	69	78	86	94	98	99	95	89	81	76	74
50	RA	14 5	13.0	14.2	15.1	15.8	16.2	16.2	16.0	15.5	15.0	14.7	14.7	15.3	16.4
	DEC	-36 14	45	50	56	62	67	71	73	72	69	65	61	59	60
51	RA	14 14	31.4	32.4	33.2	33.9	34.2	34.1	33.9	33.5	33.0	32.7	32.7	33.1	33.9
	DEC	19 18	32	26	24	26	30	35	39	41	41	38	32	24	16
52	RA	14 37	54.6	56.4	57.8	59.1	59.7	59.8	59.3	58.4	57.3	56.6	56.4	57.1	58.7
	DEC	-60 43	39	41	46	54	62	69	74	76	73	67	59	53	51
53	RA	14 49	29.9	30.9	31.7	32.5	32.9	33.1	33.0	32.7	32.2	31.9	31.8	32.2	33.0
	DEC	-15 56	19	23	27	30	32	32	31	30	28	27	26	27	31
54	RA	14 50	42.2	44.7	47.0	48.9	49.6	49.1	47.5	45.2	42.8	40.8	39.8	40.0	41.5
	DEC	74 14	68	63	64	70	80	89	96	98	95	88	78	67	57
55	RA	15 33	37.4	38.3	39.2	40.0	40.6	40.8	40.7	40.3	39.7	39.2	38.9	39.0	39.7
	DEC	26 47	44	37	34	36	42	49	55	59	60	58	52	44	35

Table 10a. Apparent Places of Stars, 1975 (Degrees) — Continued

STAR NO.	Right ascension Decli- nation	(Hr Min) (° ')	Zero hours universal time (GMT) of first day of month												
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
			Seconds (time of RA; arc of DEC)												
56	RA DEC	15 58 -22 33	51.2 2	52.1 5	53.1 8	54.0 11	54.7 12	55.1 13	55.1 13	54.9 13	54.4 12	53.9 10	53.6 9	53.8 8	54.5 10
57	RA DEC	16 27 -26 22	52.3 36	53.2 37	54.2 39	55.1 41	55.9 43	56.4 44	56.6 45	56.4 45	55.9 45	55.4 44	55.0 42	55.1 40	55.7 40
58	RA DEC	16 45 -68 58	59.2 53	61.2 48	63.3 47	65.7 50	67.5 56	68.7 63	69.0 71	68.3 77	67.0 79	65.4 77	64.3 71	64.2 63	65.3 56
59	RA DEC	17 8 -15 41	56.3 40	57.1 43	58.0 45	58.9 45	59.7 45	60.3 44	60.6 43	60.5 41	60.1 41	59.6 40	59.1 40	59.1 40	59.6 42
60	RA DEC	17 31 -37 5	54.2 8	55.1 7	56.1 6	57.3 7	58.3 8	59.1 10	59.4 13	59.4 15	58.9 16	58.3 16	57.7 14	57.6 11	58.1 8
61	RA DEC	17 33 12 34	45.9 38	46.6 32	47.3 28	48.3 28	49.0 32	49.6 37	49.9 43	49.8 48	49.4 52	48.8 52	48.3 50	48.2 45	48.5 39
62	RA DEC	17 55 51 29	59.7 29	60.4 19	61.4 13	62.6 13	63.7 18	64.4 27	64.7 37	64.3 46	63.5 52	62.5 53	61.5 49	61.0 42	61.0 31
63	RA DEC	18 22 -34 23	30.4 49	31.1 47	32.0 45	33.1 44	34.1 44	35.0 44	35.5 46	35.6 47	35.3 49	34.7 50	34.1 49	33.8 47	34.1 44
64	RA DEC	18 36 38 45	4.4 38	4.9 29	5.6 23	6.6 22	7.6 26	8.4 34	8.8 43	8.8 52	8.3 58	7.6 61	6.8 59	6.3 53	6.3 44
65	RA DEC	18 53 -26 19	42.6 42	43.1 41	43.9 39	44.9 38	45.8 36	46.7 35	47.3 34	47.5 35	47.3 36	46.8 37	46.2 37	45.9 36	46.0 35
66	RA DEC	19 49 8 48	33.4 11	33.7 6	34.2 3	35.0 2	35.9 5	36.8 11	37.4 17	37.7 23	37.6 28	37.2 29	36.6 29	36.2 26	36.2 22
67	RA DEC	20 23 -56 48	39.8 61	40.1 54	40.9 47	42.2 41	43.6 37	45.2 36	46.4 38	47.0 43	47.0 49	46.3 54	45.3 56	44.5 54	44.1 48
68	RA DEC	20 40 45 11	33.9 39	33.8 30	34.2 23	35.1 18	36.2 18	37.3 24	38.2 33	38.6 43	38.5 53	37.9 59	37.1 62	36.4 60	35.9 54
69	RA DEC	21 38 -77 29	42.2 76	41.5 66	42.1 56	44.2 46	47.1 39	50.6 37	53.7 38	55.8 44	56.3 53	55.1 61	52.6 66	49.9 65	47.7 59
70	RA DEC	21 42 9 45	57.5 44	57.4 40	57.6 37	58.2 36	59.0 38	59.9 43	60.7 50	61.3 57	61.6 62	61.4 65	61.0 66	60.5 64	60.3 61
71	RA DEC	22 6 -47 4	39.6 63	39.4 58	39.6 51	40.3 43	41.3 36	42.5 31	43.7 29	44.6 30	45.0 35	44.9 41	44.2 46	43.5 47	43.0 45
72	RA DEC	22 56 -29 44	16.6 81	16.3 80	16.4 76	16.7 69	17.4 63	18.4 56	19.4 51	20.3 50	20.8 51	20.8 54	20.5 59	20.0 62	19.6 63
73	RA DEC	23 3 15 4	31.3 25	31.0 21	31.0 17	31.3 15	32.0 16	32.9 21	33.8 27	34.6 34	35.1 40	35.1 44	34.9 46	34.5 46	34.2 44

Table 10b. Apparent Places of Stars, 1975 (Mils of Declination)

STAR NO.	Right ascension Declination	(Hr Min) (Mils)	Zero hours universal time (GMT) of first day of month												
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
			Seconds of time of RA; mils of DEC												
1	RA	0 7	6.4	6.0	5.8	5.9	6.4	7.3	8.3	9.3	9.9	10.2	10.2	9.9	9.5
	DEC	514	0.79	0.77	0.74	0.72	0.71	0.72	0.75	0.78	0.82	0.85	0.87	0.88	0.88
2	RA	0 7	51.1	50.2	49.7	49.7	50.5	51.9	53.4	54.9	55.9	56.2	56.0	55.4	54.5
	DEC	1049	0.22	0.20	0.16	0.12	0.09	0.08	0.10	0.13	0.18	0.23	0.28	0.30	0.31
3	RA	0 24	27.1	24.5	22.9	22.5	23.5	25.8	28.7	31.8	34.2	35.1	34.2	32.1	29.2
	DEC	-1375	0.98	0.96	0.91	0.86	0.80	0.76	0.73	0.74	0.76	0.81	0.85	0.88	0.89
4	RA	0 25	3.7	3.2	2.8	2.8	3.2	4.1	5.2	6.3	7.1	7.5	7.4	6.9	6.4
	DEC	-754	0.56	0.55	0.53	0.49	0.45	0.40	0.37	0.36	0.37	0.40	0.43	0.46	0.47
5	RA	0 39	6.2	5.3	4.7	4.6	5.2	6.4	7.8	9.3	10.4	10.9	10.9	10.5	9.7
	DEC	1002	0.79	0.77	0.74	0.70	0.67	0.66	0.67	0.70	0.74	0.79	0.84	0.87	0.88
6	RA	0 42	21.0	20.6	20.4	20.3	20.7	21.4	22.3	23.2	24.0	24.4	24.4	24.2	23.8
	DEC	-322	0.21	0.21	0.20	0.18	0.16	0.12	0.09	0.06	0.06	0.06	0.08	0.10	0.12
7	RA	0 55	13.0	12.0	11.2	11.0	11.5	12.8	14.4	16.0	17.3	18.0	18.1	17.6	16.8
	DEC	1076	1.12	1.11	1.08	1.04	1.01	0.99	1.00	1.02	1.07	1.11	1.16	1.19	1.21
8	RA	1 24	12.2	11.2	10.4	10.0	10.4	11.5	13.0	14.7	16.1	17.0	17.2	17.0	16.3
	DEC	1068	0.66	0.65	0.63	0.59	0.55	0.53	0.53	0.55	0.59	0.64	0.68	0.72	0.74
9	RA	1 36	48.2	47.1	46.3	45.7	45.8	46.5	47.7	49.1	50.4	51.2	51.3	50.9	50.0
	DEC	-1019	0.86	0.86	0.83	0.79	0.74	0.69	0.65	0.63	0.64	0.67	0.71	0.75	0.78

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See Table 11. Apparent Places of Polaris, 1975

11	RA DEC	2 5 415	47.3 0.07	46.9 0.06	46.5 0.05	46.2 0.03	46.4 0.03	46.9 0.03	47.8 0.04	48.8 0.07	49.7 0.09	50.4 0.12	50.7 0.13	50.8 0.14	50.6 0.14
12	RA DEC	2 57 -718	20.4 0.35	19.7 0.36	19.1 0.36	18.5 0.33	18.3 0.29	18.6 0.25	19.3 0.20	20.3 0.17	21.4 0.16	22.2 0.18	22.7 0.21	22.7 0.25	22.4 0.29
13	RA DEC	3 0 70	60.1 0.99	59.7 0.98	59.3 0.97	58.9 0.97	58.8 0.98	59.2 0.99	59.9 1.02	60.8 1.04	61.7 1.06	62.4 1.07	62.9 1.07	63.1 1.05	63.0 1.04
14	RA DEC	3 22 884	34.8 0.92	34.2 0.93	33.4 0.93	32.8 0.90	32.6 0.88	33.0 0.85	34.0 0.84	35.3 0.84	36.7 0.86	37.8 0.89	38.6 0.92	39.0 0.95	38.9 0.97
15	RA DEC	4 34 292	31.4 0.63	31.2 0.62	30.7 0.62	30.2 0.61	29.9 0.61	30.1 0.61	30.6 0.62	31.4 0.64	32.3 0.65	33.2 0.66	34.0 0.66	34.5 0.65	34.7 0.65
16	RA DEC	5 13 -146	22.3 0.33	22.2 0.35	21.7 0.36	21.2 0.36	20.8 0.35	20.7 0.33	21.1 0.30	21.7 0.27	22.6 0.26	23.5 0.25	24.2 0.27	24.8 0.29	25.0 0.32
17	RA DEC	5 14 817	53.7 0.33	53.5 0.35	52.9 0.35	52.1 0.35	51.6 0.33	51.6 0.31	52.1 0.29	53.1 0.28	54.3 0.28	55.5 0.28	56.7 0.29	57.5 0.31	57.9 0.33
18	RA DEC	5 23 112	49.7 0.49	49.6 0.47	49.2 0.47	48.6 0.46	48.3 0.47	48.2 0.48	48.6 0.49	49.2 0.51	50.1 0.52	51.0 0.52	51.8 0.52	52.4 0.50	52.7 0.49
19	RA DEC	5 24 508	45.3 0.22	45.2 0.23	44.8 0.23	44.2 0.22	43.8 0.22	43.7 0.21	44.1 0.20	44.9 0.20	45.9 0.21	46.9 0.21	47.8 0.21	48.5 0.22	48.9 0.22

Table 10b. Apparent Places of Stars, 1975 (Mils of Declination) — Continued

STAR NO.	Right ascension Declination (Mils)	(Hr Min)	Zero hours universal time (GMT) of first day of month											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			Seconds of time of RA; mils of DEC											
20	RA DEC	5 34 -21	58.9 0.65	58.8 0.67	58.4 0.68	57.9 0.68	57.5 0.68	57.4 0.66	57.7 0.64	58.3 0.62	59.2 0.61	60.0 0.60	60.8 0.61	61.4 0.63
21	RA DEC	5 39 -34	32.1 0.77	32.0 0.79	31.6 0.80	31.1 0.81	30.7 0.80	30.6 0.78	30.9 0.76	31.5 0.74	32.3 0.72	33.2 0.72	34.0 0.73	34.6 0.75
22	RA DEC	5 53 131	51.5 0.60	51.4 0.59	51.1 0.58	50.5 0.58	50.1 0.58	50.0 0.59	50.3 0.60	50.9 0.61	51.7 0.63	52.6 0.63	53.4 0.62	54.1 0.60
23	RA DEC	6 23 -936	26.5 0.59	26.2 0.64	25.5 0.67	24.4 0.68	23.4 0.67	22.8 0.63	22.7 0.59	23.2 0.54	24.1 0.51	25.3 0.50	26.5 0.51	27.4 0.56
24	RA DEC	6 36 291	18.6 0.91	18.7 0.91	18.4 0.91	17.9 0.91	17.4 0.91	17.2 0.91	17.4 0.91	17.9 0.92	18.7 0.92	19.5 0.92	20.5 0.91	21.3 0.90
25	RA DEC	6 44 -296	4.9 0.59	4.9 0.62	4.6 0.64	4.0 0.65	3.5 0.64	3.2 0.62	3.3 0.60	3.7 0.57	4.4 0.54	5.3 0.54	6.2 0.56	6.9 0.59
26	RA DEC	6 57 -514	40.9 0.47	41.0 0.51	40.6 0.54	39.9 0.55	39.3 0.54	38.9 0.52	38.9 0.48	39.3 0.45	40.0 0.42	40.8 0.41	41.8 0.42	42.6 0.46
27	RA DEC	7 7 -468	24.8 0.52	24.9 0.56	24.5 0.59	23.9 0.60	23.3 0.59	23.0 0.57	22.9 0.54	23.2 0.50	23.9 0.48	24.7 0.47	25.7 0.48	26.5 0.51
28	RA DEC	7 33 567	3.0 0.86	3.3 0.86	3.2 0.87	2.6 0.88	2.0 0.88	1.7 0.88	1.7 0.87	2.1 0.86	2.8 0.84	3.7 0.83	4.8 0.82	5.8 0.81
29	RA DEC	7 38 93	2.0 1.00	2.3 0.99	2.1 0.98	1.7 0.97	1.2 0.98	0.9 0.99	0.9 1.00	1.2 1.01	1.8 1.01	2.5 1.01	3.4 0.99	4.3 0.97
30	RA DEC	7 43 499	49.9 0.29	50.2 0.29	50.1 0.30	49.6 0.31	49.0 0.31	48.7 0.31	48.6 0.30	49.0 0.29	49.6 0.28	50.5 0.27	51.5 0.25	52.5 0.24
31	RA DEC	8 8 -840	48.3 0.23	48.6 0.28	48.2 0.33	47.5 0.35	46.7 0.36	45.9 0.34	45.5 0.31	45.6 0.27	46.1 0.23	47.0 0.20	48.2 0.21	49.3 0.24
32	RA DEC	8 21 -1056	63.2 0.51	63.5 0.57	63.1 0.61	62.0 0.65	60.9 0.66	59.8 0.65	59.1 0.61	59.0 0.57	59.5 0.52	60.6 0.50	62.0 0.49	63.5 0.52
33	RA DEC	9 7 -770	6.9 0.33	7.4 0.38	7.4 0.43	6.9 0.46	6.2 0.48	5.5 0.47	5.0 0.44	4.9 0.41	5.2 0.37	5.9 0.34	6.9 0.34	8.1 0.36
34	RA DEC	9 12 -1237	59.8 0.56	60.5 0.62	60.2 0.67	59.0 0.72	57.4 0.74	55.6 0.74	54.3 0.72	53.6 0.68	53.8 0.63	55.0 0.59	56.9 0.58	59.1 0.60
35	RA DEC	9 26 -152	23.5 0.03	24.1 0.06	24.2 0.08	23.9 0.10	23.5 0.10	23.1 0.09	22.9 0.07	22.9 0.06	23.1 0.04	23.7 0.04	24.5 0.05	25.4 0.07
36	RA DEC	10 7 214	4.3 0.87	5.1 0.85	5.3 0.85	5.2 0.85	4.8 0.86	4.4 0.87	4.1 0.87	4.0 0.88	4.2 0.87	4.6 0.86	5.4 0.84	6.3 0.81
37	RA DEC	11 0 1004	22.4 0.62	23.6 0.63	24.3 0.66	24.2 0.70	23.6 0.73	22.7 0.74	21.9 0.74	21.4 0.72	21.3 0.68	21.6 0.63	22.5 0.58	23.9 0.55

Table 10b. Apparent Places of Stars, 1975 (Mils of Declination) — Continued

STAR NO.	Right ascension Decli- nation	(Hr Min) (Mils)	Zero hours universal time (GMT) of first day of month												
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
			Seconds of time of RA; mils of DEC												
38	RA DEC	11 2 1099	13.8 1.08	15.2 1.09	15.9 1.12	15.8 1.16	15.1 1.19	14.0 1.21	13.1 1.20	12.3 1.17	12.2 1.13	12.6 1.08	13.6 1.03	15.1 1.00	16.9 0.98
39	RA DEC	11 47 261	48.3 0.48	49.3 0.46	49.8 0.45	50.0 0.46	49.8 0.47	49.5 0.48	49.2 0.49	48.9 0.50	48.7 0.49	48.9 0.47	49.3 0.45	50.1 0.42	51.2 0.38
40	RA DEC	11 52 956	32.4 0.93	33.8 0.93	34.6 0.95	34.8 0.98	34.4 1.02	33.7 1.04	32.9 1.05	32.2 1.03	31.9 1.00	32.0 0.95	32.6 0.90	33.7 0.86	35.1 0.83
41	RA DEC	12 14 -309	32.3 0.40	33.2 0.43	33.8 0.46	34.1 0.49	34.1 0.50	33.8 0.50	33.5 0.49	33.1 0.48	32.9 0.46	33.0 0.45	33.4 0.45	34.2 0.46	35.2 0.49
42	RA DEC	12 25 -1119	13.5 0.24	15.2 0.28	16.3 0.32	16.8 0.38	16.7 0.42	16.0 0.45	15.0 0.46	14.0 0.45	13.2 0.42	13.1 0.38	13.7 0.34	15.1 0.32	17.0 0.33
43	RA DEC	12 29 -1012	47.7 0.81	49.2 0.84	50.1 0.89	50.6 0.94	50.6 0.98	50.1 1.01	49.3 1.02	48.5 1.00	47.9 0.97	47.7 0.94	48.3 0.90	49.5 0.89	51.1 0.90
44	RA DEC	12 46 -1058	16.4 0.65	18.0 0.68	19.1 0.73	19.7 0.78	19.8 0.82	19.3 0.85	18.5 0.86	17.6 0.85	16.8 0.82	16.6 0.79	17.1 0.75	18.3 0.73	20.0 0.74
45	RA DEC	12 52 997	56.3 0.13	57.8 0.12	58.8 0.14	59.3 0.18	59.2 0.22	58.6 0.25	57.8 0.26	56.9 0.26	56.2 0.23	55.9 0.19	56.2 0.13	57.1 0.08	58.5 0.05
46	RA DEC	13 22 978	55.2 0.66	56.7 0.64	57.8 0.65	58.4 0.69	58.4 0.73	58.0 0.76	57.2 0.78	56.3 0.78	55.5 0.76	55.1 0.72	55.2 0.67	55.9 0.61	57.2 0.57
47	RA DEC	13 23 -196	53.2 0.12	54.2 0.15	54.9 0.18	55.4 0.19	55.6 0.20	55.5 0.20	55.3 0.19	54.9 0.18	54.6 0.17	54.4 0.16	54.6 0.16	55.2 0.18	56.2 0.21
48	RA DEC	13 46 878	33.2 0.79	34.6 0.77	35.6 0.78	36.3 0.81	36.4 0.85	36.1 0.88	35.6 0.91	34.8 0.91	34.1 0.90	33.6 0.86	33.6 0.81	34.1 0.76	35.3 0.72
49	RA DEC	14 2 -1071	3.5 0.11	5.3 0.12	6.7 0.16	7.8 0.20	8.3 0.24	8.2 0.28	7.7 0.30	6.7 0.30	5.8 0.29	5.2 0.25	5.2 0.22	6.1 0.19	7.8 0.18
50	RA DEC	14 5 -644	13.0 0.37	14.2 0.40	15.1 0.42	15.8 0.45	16.2 0.48	16.2 0.50	16.0 0.51	15.5 0.50	15.0 0.49	14.7 0.47	14.7 0.45	15.3 0.44	16.4 0.45
51	RA DEC	14 14 343	31.4 0.27	32.4 0.24	33.2 0.23	33.9 0.24	34.2 0.26	34.1 0.28	33.9 0.30	33.5 0.31	33.0 0.31	32.7 0.30	32.7 0.27	33.1 0.23	33.9 0.19
52	RA DEC	14 37 -1079	54.6 0.60	56.4 0.61	57.8 0.63	59.1 0.67	59.7 0.71	59.8 0.75	59.3 0.77	58.4 0.78	57.3 0.77	56.6 0.74	56.4 0.70	57.1 0.67	58.7 0.66
53	RA DEC	14 49 -283	29.9 0.35	30.9 0.37	31.7 0.39	32.5 0.41	32.9 0.42	33.1 0.42	33.0 0.41	32.7 0.41	32.2 0.40	31.9 0.39	31.8 0.39	32.2 0.39	33.0 0.41
54	RA DEC	14 50 1319	42.2 1.04	44.7 1.02	47.0 1.02	48.9 1.05	49.6 1.10	49.1 1.14	47.5 1.18	45.2 1.19	42.8 1.18	40.8 1.14	39.8 1.09	40.0 1.03	41.5 0.98
55	RA DEC	15 33 476	37.4 0.37	38.3 0.33	39.2 0.32	40.0 0.33	40.6 0.35	40.8 0.39	40.7 0.42	40.3 0.44	39.7 0.45	39.2 0.43	38.9 0.40	39.0 0.37	39.7 0.32

Table 10b. Apparent Places of Stars, 1975 (Mils of Declination) — Continued

STAR NO.	Right ascension Declination	(Hr Min) (Mils)	Zero hours universal time (GMT) of first day of month												
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
			Seconds of time of RA; mils of DEC												
56	RA DEC	15 58 -400	51.2 0.90	52.1 0.91	53.1 0.93	54.0 0.94	54.7 0.95	55.1 0.95	55.1 0.96	54.9 0.95	54.4 0.95	53.9 0.94	53.6 0.93	53.8 0.93	54.5 0.94
57	RA DEC	16 27 -468	52.3 0.92	53.2 0.93	54.2 0.94	55.1 0.95	55.9 0.95	56.4 0.96	56.6 0.96	56.4 0.97	55.9 0.96	55.4 0.96	55.0 0.95	55.1 0.94	55.7 0.94
58	RA DEC	16 45 -1226	59.2 0.33	61.2 0.31	63.3 0.31	65.7 0.32	67.5 0.35	68.7 0.39	69.0 0.42	68.3 0.45	67.0 0.46	65.4 0.46	64.3 0.43	64.2 0.39	65.3 0.35
59	RA DEC	17 8 -279	56.3 0.01	57.1 0.03	58.0 0.03	58.9 0.04	59.7 0.04	60.3 0.03	60.6 0.02	60.5 0.02	60.1 0.02	59.6 0.01	59.1 0.01	59.1 0.01	59.6 0.02
60	RA DEC	17 31 -659	54.2 0.30	55.1 0.29	56.1 0.29	57.3 0.29	58.3 0.30	59.1 0.31	59.4 0.32	59.4 0.33	58.9 0.34	58.3 0.34	57.7 0.33	57.6 0.31	58.1 0.30
61	RA DEC	17 33 223	45.9 0.60	46.6 0.57	47.3 0.55	48.3 0.55	49.0 0.56	49.6 0.59	49.9 0.62	49.8 0.65	49.4 0.66	48.8 0.66	48.3 0.65	48.2 0.63	48.5 0.60
62	RA DEC	17 55 915	59.7 0.40	60.4 0.35	61.4 0.32	62.6 0.32	63.7 0.35	64.4 0.39	64.7 0.44	64.3 0.49	63.5 0.51	62.5 0.52	61.5 0.50	61.0 0.46	61.0 0.41
63	RA DEC	18 22 -611	30.4 0.50	31.1 0.49	32.0 0.48	33.1 0.48	34.1 0.48	35.0 0.48	35.5 0.48	35.6 0.49	35.3 0.50	34.7 0.51	34.1 0.50	33.8 0.49	34.1 0.48
64	RA DEC	18 36 689	4.4 0.08	4.9 0.03	5.6 0.0	6.6 0.0	7.6 0.02	8.4 0.06	8.8 0.10	8.8 0.15	8.3 0.18	7.6 0.19	6.8 0.18	6.3 0.15	6.3 0.11
65	RA DEC	18 53 -468	42.6 0.06	43.1 0.05	43.9 0.05	44.9 0.04	45.8 0.03	46.7 0.02	47.3 0.02	47.5 0.02	47.3 0.03	46.8 0.03	46.2 0.03	45.9 0.03	46.0 0.02
66	RA DEC	19 49 156	33.4 0.50	33.7 0.47	34.2 0.46	35.0 0.46	35.9 0.47	36.8 0.50	37.4 0.53	37.7 0.56	37.6 0.58	37.2 0.59	36.6 0.59	36.2 0.58	36.2 0.55
67	RA DEC	20 23 -1009	39.8 1.08	40.1 1.05	40.9 1.01	42.2 0.98	43.6 0.96	45.2 0.95	46.4 0.96	47.0 0.99	47.0 1.02	46.3 1.04	45.3 1.05	44.5 1.04	44.1 1.02
68	RA DEC	20 40 803	33.9 0.45	33.8 0.41	34.2 0.37	35.1 0.35	36.2 0.35	37.3 0.38	38.2 0.42	38.6 0.47	38.5 0.52	37.9 0.55	37.1 0.57	36.4 0.56	35.9 0.52
69	RA DEC	21 38 -1377	42.2 0.86	41.5 0.81	42.1 0.76	44.2 0.71	47.1 0.68	50.6 0.66	53.7 0.67	55.8 0.70	56.3 0.74	55.1 0.78	52.6 0.81	49.9 0.80	47.7 0.77
70	RA DEC	21 42 173	57.5 0.55	57.4 0.53	57.6 0.52	58.2 0.51	59.0 0.52	59.9 0.55	60.7 0.58	61.3 0.61	61.6 0.64	61.4 0.65	61.0 0.66	60.5 0.65	60.3 0.64
71	RA DEC	22 6 -836	39.6 1.05	39.4 1.03	39.6 0.99	40.3 0.95	41.3 0.92	42.5 0.89	43.7 0.88	44.6 0.89	45.0 0.91	44.9 0.94	44.2 0.97	43.5 0.98	43.0 0.97
72	RA DEC	22 56 -528	16.6 0.99	16.3 0.99	16.4 0.97	16.7 0.94	17.4 0.90	18.4 0.87	19.4 0.85	20.3 0.84	20.8 0.84	20.8 0.86	20.5 0.88	20.0 0.90	19.6 0.90
73	RA DEC	23 3 267	31.3 0.97	31.0 0.95	31.0 0.94	31.3 0.93	32.0 0.93	32.9 0.95	33.8 0.98	34.6 1.02	35.1 1.05	35.1 1.07	34.9 1.08	34.5 1.08	34.2 1.07

Table 11. Apparent Place of Polaris (Star No. 10), 1975
For Zero hours universal time (GMT) on 0, 10th, 20th, 30th Days of Month

		Declination				Right Ascension		
		°	'	"	m	h	m	s
JAN	0	89	9	22	1585.00	2	8	35
	10			24	1585.01			23
	20			24	1585.01			8
	30			25	1585.01		7	54
FEB	0	89	9	25	1585.01	2	7	52
	10			24	1585.01			39
	20			23	1585.00			25
	30			21	1585.00			12
MAR	0	89	9	22	1585.00	2	7	15
	10			20	1584.99			4
	20			17	1584.97		6	55
	30			14	1584.96			49
APR	0	89	9	14	1584.96	2	6	49
	10			11	1584.94			45
	20			8	1584.93			45
	30			5	1584.91			47
MAY	0	89	9	5	1584.91	2	6	47
	10			2	1584.90			51
	20		8	59	1584.88			59
	30			57	1584.87		7	9
JUN	0	89	8	56	1584.87	2	7	9
	10			54	1584.86		7	21
	20			53	1584.85			34
	30			52	1584.85			48
JUL	0	89	8	52	1584.85	2	7	48
	10			52	1584.85		8	3
	20			52	1584.85			19
	30			52	1584.85			34
AUG	0	89	8	52	1584.85	2	8	35
	10			54	1584.86			51
	20			56	1584.87		9	6
	30			57	1584.88			19
SEP	0	89	8	58	1584.88	2	9	21
	10		9	0	1584.89			33
	20			3	1584.91			44
	30			7	1584.92			54
OCT	0	89	9	7	1584.92	2	9	54
	10			10	1584.94		10	1
	20			14	1584.96			6
	30			17	1584.98			9
NOV	0	89	9	18	1584.98	2	10	9
	10			22	1585.00			10
	20			25	1585.01			8
	30			28	1585.03			3
DEC	0	89	9	28	1585.03	2	10	3
	10			32	1585.05		9	56
	20			34	1585.06			47
	30			36	1585.07			36
JAN	0	89	9	36	1585.07	2	9	35

Table 12. To Determine Latitude and Azimuth From Polaris, 1975

L.S.T.	0 ^h		1 ^h		2 ^h		3 ^h		4 ^h		5 ^h	
	<i>a</i> ₀	<i>b</i> ₀	<i>a</i> ₀	<i>b</i> ₀	<i>a</i> ₀	<i>b</i> ₀	<i>a</i> ₀	<i>b</i> ₀	<i>a</i> ₀	<i>b</i> ₀	<i>a</i> ₀	<i>b</i> ₀
m												
0	-42.8	+27.5	-48.5	+15.3	-50.8	+ 2.0	-49.5	-11.4	-44.9	-24.0	-37.1	-34.9
3	43.2	26.9	48.7	14.7	50.8	1.4	49.4	12.1	44.5	24.6	36.6	35.4
6	43.5	26.4	48.9	14.0	50.8	+ 0.7	49.2	12.7	44.2	25.2	36.2	35.9
9	43.9	25.8	49.0	13.4	50.8	0.0	49.0	13.4	43.9	25.8	35.7	36.4
12	44.2	25.2	49.2	12.7	50.8	- 0.7	48.9	14.0	43.5	26.4	35.2	36.8
15	-44.5	+24.6	-49.4	+12.1	-50.8	- 1.4	-48.7	-14.7	-43.2	-26.9	-34.7	-37.3
18	44.9	24.0	49.5	11.4	50.8	2.0	48.5	15.3	42.8	27.5	34.2	37.7
21	45.2	23.4	49.7	10.7	50.7	2.7	48.3	16.0	42.5	28.1	33.7	38.2
24	45.5	22.8	49.8	10.1	50.7	3.4	48.1	16.6	42.1	28.6	33.2	38.6
27	45.8	22.2	49.9	9.4	50.6	4.1	47.8	17.2	41.7	29.2	32.7	39.1
30	-46.1	+21.6	-50.1	+ 8.8	-50.6	- 4.7	-47.6	-17.9	-41.3	-29.7	-32.2	-39.5
33	46.3	21.0	50.2	8.1	50.5	5.4	47.4	18.5	40.9	30.3	31.7	39.9
36	46.6	20.4	50.3	7.4	50.4	6.1	47.1	19.1	40.5	30.8	31.2	40.3
39	46.9	19.8	50.4	6.7	50.4	6.7	46.9	19.8	40.1	31.4	30.6	40.7
42	47.1	19.1	50.4	6.1	50.3	7.4	46.6	20.4	39.7	31.9	30.1	41.1
45	-47.4	+18.5	-50.5	+ 5.4	-50.2	- 8.1	-46.3	-21.0	-39.3	-32.4	-29.6	-41.5
48	47.6	17.9	50.6	4.7	50.1	8.8	46.1	21.6	38.9	32.9	29.0	41.9
51	47.8	17.2	50.6	4.1	49.9	9.4	45.8	22.2	38.4	33.4	28.5	42.3
54	48.1	16.6	50.7	3.4	49.8	10.1	45.5	22.8	38.0	33.9	27.9	42.7
57	48.3	16.0	50.7	2.7	49.7	10.7	45.2	23.4	37.6	34.4	27.4	43.0
60	-48.5	+15.3	-50.8	+ 2.0	-49.5	-11.4	-44.9	-24.0	-37.1	-34.9	-26.8	-43.4
Lat.	<i>a</i> ₁	<i>b</i> ₁	<i>a</i> ₁	<i>b</i> ₁	<i>a</i> ₁	<i>b</i> ₁	<i>a</i> ₁	<i>b</i> ₁	<i>a</i> ₁	<i>b</i> ₁	<i>a</i> ₁	<i>b</i> ₁
°												
0	-1	-3	0	-1	0	+1	-1	+3	-1	+4	-3	+4
10	-1	-3	0	-1	0	+1	0	+2	-1	+4	-2	+4
20	-1	-2	0	-1	0	+1	0	+2	-1	+3	-2	+3
30	0	-2	0	-1	0	0	0	+1	-1	+2	-1	+2
40	0	-1	0	0	0	0	0	+1	0	+1	-1	+1
45	0	-1	0	0	0	0	0	0	0	+1	0	+1
50	0	0	0	0	0	0	0	0	0	0	0	0
55	0	+1	0	0	0	0	0	-1	0	-1	+1	-1
60	0	+2	0	+1	0	0	0	-1	+1	-2	+1	-2
62	0	+2	0	+1	0	0	0	-2	+1	-2	+2	-3
64	+1	+2	0	+1	0	-1	0	-2	+1	-3	+2	-3
66	+1	+3	0	+1	0	-1	0	-3	+1	-4	+2	-4
Month	<i>a</i> ₂	<i>b</i> ₂	<i>a</i> ₂	<i>b</i> ₂	<i>a</i> ₂	<i>b</i> ₂	<i>a</i> ₂	<i>b</i> ₂	<i>a</i> ₂	<i>b</i> ₂	<i>a</i> ₂	<i>b</i> ₂
Jan.	+1	-2	+2	-2	+2	-2	+2	-1	+3	0	+3	0
Feb.	0	-4	+1	-4	+2	-3	+3	-2	+3	-2	+4	-1
Mar.	-1	-4	0	-4	+1	-4	+2	-4	+3	-3	+4	-2
Apr.	-2	-4	-1	-5	0	-5	+1	-5	+2	-4	+3	-4
May	-4	-3	-3	-4	-2	-5	0	-5	+1	-5	+2	-4
June	-4	-2	-3	-3	-3	-4	-2	-4	0	-4	+1	-4
July	-4	0	-3	-1	-3	-2	-2	-3	-2	-3	-1	-4
Aug.	-3	+1	-3	0	-3	0	-3	-1	-2	-2	-2	-2
Sept.	-1	+2	-1	+2	-2	+1	-2	+1	-2	0	-2	0
Oct.	+1	+2	0	+2	0	+2	-1	+2	-1	+2	-2	+2
Nov.	+3	+1	+2	+2	+2	+3	+1	+3	0	+3	-1	+3
Dec.	+4	0	+4	+1	+3	+2	+3	+3	+2	+3	+1	+4

Latitude = Corrected observed altitude of Polaris + *a*₀ + *a*₁ + *a*₂Azimuth of Polaris = $\frac{b_0 + b_1 + b_2}{\cos \text{Latitude}}$

Table 12. To Determine Latitude and Azimuth From Polaris, 1975 — Continued

L.S.T.	6 ^h		7 ^h		8 ^h		9 ^h		10 ^h		11 ^h	
	<i>a</i> ₀	<i>b</i> ₀	<i>a</i> ₀	<i>b</i> ₀	<i>a</i> ₀	<i>b</i> ₀	<i>a</i> ₀	<i>b</i> ₀	<i>a</i> ₀	<i>b</i> ₀	<i>a</i> ₀	<i>b</i> ₀
m												
0	-26.8	-43.4	-14.7	-48.8	-1.5	-50.8	+11.6	-49.4	+24.0	-44.6	+34.7	-36.9
3	26.2	43.7	14.0	49.0	0.9	50.8	12.3	49.2	24.6	44.3	35.2	36.4
6	25.6	44.1	13.4	49.1	-0.2	50.8	12.9	49.0	25.2	43.9	35.7	35.9
9	25.1	44.4	12.7	49.3	+0.4	50.8	13.6	48.8	25.7	43.6	36.1	35.5
12	24.5	44.7	12.1	49.5	1.1	50.8	14.2	48.7	26.3	43.3	36.6	35.0
15	-23.9	-45.0	-11.4	-49.6	+1.8	-50.8	+14.8	-48.5	+26.9	-42.9	+37.1	-34.5
18	23.3	45.3	10.8	49.7	2.4	50.7	15.5	48.3	27.4	42.6	37.5	34.0
21	22.7	45.6	10.1	49.9	3.1	50.7	16.1	48.1	28.0	42.2	38.0	33.5
24	22.1	45.9	9.5	50.0	3.8	50.6	16.7	47.8	28.5	41.8	38.4	33.1
27	21.5	46.2	8.8	50.1	4.4	50.6	17.4	47.6	29.1	41.4	38.8	32.6
30	-20.9	-46.5	-8.2	-50.2	+5.1	-50.5	+18.0	-47.4	+29.6	-41.1	+39.2	-32.0
33	20.3	46.7	7.5	50.3	5.8	50.4	18.6	47.1	30.2	40.7	39.7	31.5
36	19.7	47.0	6.9	50.4	6.4	50.3	19.2	46.9	30.7	40.3	40.1	31.0
39	19.1	47.2	6.2	50.5	7.1	50.2	19.8	46.6	31.2	39.9	40.5	30.5
42	18.4	47.5	5.5	50.6	7.7	50.1	20.4	46.4	31.7	39.5	40.9	30.0
45	-17.8	-47.7	-4.9	-50.6	+8.4	-50.0	+21.0	-46.1	+32.2	-39.0	+41.3	-29.4
48	17.2	48.0	4.2	50.7	9.0	49.9	21.6	45.8	32.7	38.6	41.6	28.9
51	16.6	48.2	3.5	50.7	9.7	49.8	22.2	45.5	33.3	38.2	42.0	28.4
54	15.9	48.4	2.9	50.7	10.3	49.7	22.8	45.2	33.7	37.7	42.4	27.8
57	15.3	48.6	2.2	50.8	11.0	49.5	23.4	44.9	34.2	37.3	42.7	27.3
60	-14.7	-48.8	-1.5	-50.8	+11.6	-49.4	+24.0	-44.6	+34.7	-36.9	+43.1	-26.7
Lat.	<i>a</i> ₁	<i>b</i> ₁	<i>a</i> ₁	<i>b</i> ₁	<i>a</i> ₁	<i>b</i> ₁	<i>a</i> ₁	<i>b</i> ₁	<i>a</i> ₁	<i>b</i> ₁	<i>a</i> ₁	<i>b</i> ₁
°												
0	-4	+3	-4	+1	-4	-1	-4	-3	-3	-4	-2	-4
10	-3	+3	-4	+1	-4	-1	-3	-2	-3	-4	-2	-4
20	-3	+2	-3	+1	-3	-1	-3	-2	-2	-3	-1	-3
30	-2	+2	-2	+1	-2	0	-2	-1	-2	-2	-1	-2
40	-1	+1	-1	0	-1	0	-1	-1	-1	-1	-1	-1
45	-1	+1	-1	0	-1	0	-1	0	0	-1	0	-1
50	0	0	0	0	0	0	0	0	0	0	0	0
55	+1	-1	+1	0	+1	0	+1	+1	+1	+1	0	+1
60	+2	-2	+2	-1	+2	0	+2	+1	+1	+2	+1	+2
62	+2	-2	+3	-1	+3	0	+2	+2	+2	+2	+1	+3
64	+3	-2	+3	-1	+3	+1	+3	+2	+2	+3	+1	+3
66	+3	-3	+4	-1	+4	+1	+3	+3	+3	+4	+2	+4
Month	<i>a</i> ₂	<i>b</i> ₂	<i>a</i> ₂	<i>b</i> ₂	<i>a</i> ₂	<i>b</i> ₂	<i>a</i> ₂	<i>b</i> ₂	<i>a</i> ₂	<i>b</i> ₂	<i>a</i> ₂	<i>b</i> ₂
Jan.	+2	+1	+2	+2	+2	+2	+1	+2	0	+3	0	+3
Feb.	+4	0	+4	+1	+3	+2	+2	+3	+2	+3	+1	+4
Mar.	+4	-1	+4	0	+4	+1	+4	+2	+3	+3	+2	+4
Apr.	+4	-2	+5	-1	+5	0	+5	+1	+4	+2	+4	+3
May	+3	-4	+4	-3	+5	-2	+5	0	+5	+1	+4	+2
June	+2	-4	+3	-3	+4	-3	+4	-2	+4	0	+4	+1
July	0	-4	+1	-3	+2	-3	+3	-2	+3	-2	+4	-1
Aug.	-1	-3	0	-3	0	-3	+1	-3	+2	-2	+2	-2
Sept.	-2	-1	-2	-1	-1	-2	-1	-2	0	-2	0	-2
Oct.	-2	+1	-2	0	-2	0	-2	-1	-2	-1	-2	-2
Nov.	-1	+3	-2	+2	-3	+2	-3	+1	-3	0	-3	-1
Dec.	0	+4	-1	+4	-2	+3	-3	+3	-3	+2	-4	+1

Latitude = Corrected observed altitude of Polaris + *a*₀ + *a*₁ + *a*₂Azimuth of Polaris = $\frac{b_0 + b_1 + b_2}{\cos \text{Latitude}}$

Table 12. To Determine Latitude and Azimuth From Polaris, 1975 — Continued

L.S.T.	12 ^h		13 ^h		14 ^h		15 ^h		16 ^h		17 ^h	
	<i>a</i> ₀	<i>b</i> ₀	<i>a</i> ₀	<i>b</i> ₀	<i>a</i> ₀	<i>b</i> ₀	<i>a</i> ₀	<i>b</i> ₀	<i>a</i> ₀	<i>b</i> ₀	<i>a</i> ₀	<i>b</i> ₀
m	/		/		/		/		/		/	
0	+43.1	-26.7	+48.6	-14.8	+50.8	- 2.0	+49.6	+11.0	+45.1	+23.3	+37.5	+34.0
3	43.4	26.1	48.7	14.2	50.8	1.3	49.4	11.7	44.7	23.9	37.1	34.5
6	43.8	25.6	48.9	13.6	50.8	- 0.7	49.3	12.3	44.4	24.4	36.6	35.0
9	44.1	25.0	49.1	12.9	50.8	0.0	49.1	12.9	44.1	25.0	36.1	35.5
12	44.4	24.4	49.3	12.3	50.8	+ 0.7	48.9	13.6	43.8	25.6	35.7	35.9
15	+44.7	-23.9	+49.4	-11.7	+50.8	+ 1.3	+48.7	+14.2	+43.4	+26.1	+35.2	+36.4
18	45.1	23.3	49.6	11.0	50.8	2.0	48.6	14.8	43.1	26.7	34.7	36.9
21	45.4	22.7	49.7	10.4	50.7	2.6	48.4	15.4	42.7	27.3	34.2	37.3
24	45.6	22.1	49.8	9.7	50.7	3.3	48.2	16.1	42.4	27.8	33.7	37.7
27	45.9	21.5	50.0	9.1	50.6	3.9	47.9	16.7	42.0	28.4	33.3	38.2
30	+46.2	-20.9	+50.1	- 8.5	+50.6	+ 4.6	+47.7	+17.3	+41.6	+28.9	+32.7	+38.6
33	46.5	20.3	50.2	7.8	50.5	5.2	47.5	17.9	41.3	29.4	32.2	39.0
36	46.7	19.7	50.3	7.2	50.5	5.9	47.2	18.5	40.9	30.0	31.7	39.5
39	47.0	19.1	50.4	6.5	50.4	6.5	47.0	19.1	40.5	30.5	31.2	39.9
42	47.2	18.5	50.5	5.9	50.3	7.2	46.7	19.7	40.1	31.0	30.7	40.3
45	+47.5	-17.9	+50.5	- 5.2	+50.2	+ 7.8	+46.5	+20.3	+39.7	+31.5	+30.2	+40.7
48	47.7	17.3	50.6	4.6	50.1	8.5	46.2	20.9	39.2	32.0	29.6	41.1
51	47.9	16.7	50.6	3.9	50.0	9.1	45.9	21.5	38.8	32.6	29.1	41.4
54	48.2	16.1	50.7	3.3	49.8	9.7	45.6	22.1	38.4	33.1	28.5	41.8
57	48.4	15.4	50.7	2.6	49.7	10.4	45.4	22.7	38.0	33.5	28.0	42.2
60	+48.6	-14.8	+50.8	- 2.0	+49.6	+11.0	+45.1	+23.3	+37.5	+34.0	+27.4	+42.6
Lat.	<i>a</i> ₁	<i>b</i> ₁	<i>a</i> ₁	<i>b</i> ₁	<i>a</i> ₁	<i>b</i> ₁	<i>a</i> ₁	<i>b</i> ₁	<i>a</i> ₁	<i>b</i> ₁	<i>a</i> ₁	<i>b</i> ₁
°	/		/		/		/		/		/	
0	- .1	- .3	.0	- .1	.0	+ .1	- .1	+ .3	- .1	+ .4	- .3	+ .4
10	- .1	- .3	.0	- .1	.0	+ .1	.0	+ .2	- .1	+ .4	- .2	+ .4
20	- .1	- .2	.0	- .1	.0	+ .1	.0	+ .2	- .1	+ .3	- .2	+ .3
30	.0	- .2	.0	- .1	.0	.0	.0	+ .1	- .1	+ .2	- .1	+ .2
40	.0	- .1	.0	.0	.0	.0	.0	+ .1	.0	+ .1	- .1	+ .1
45	.0	- .1	.0	.0	.0	.0	.0	.0	.0	+ .1	.0	+ .1
50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
55	.0	+ .1	.0	.0	.0	.0	.0	- .1	.0	- .1	+ .1	- .1
60	.0	+ .2	.0	+ .1	.0	.0	.0	- .1	+ .1	- .2	+ .1	- .2
62	.0	+ .2	.0	+ .1	.0	.0	.0	- .2	+ .1	- .2	+ .2	- .3
64	+ .1	+ .2	.0	+ .1	.0	- .1	.0	- .2	+ .1	- .3	+ .2	- .3
66	+ .1	+ .3	.0	+ .1	.0	- .1	.0	- .3	+ .1	- .4	+ .2	- .4
Month	<i>a</i> ₂	<i>b</i> ₂	<i>a</i> ₂	<i>b</i> ₂	<i>a</i> ₂	<i>b</i> ₂	<i>a</i> ₂	<i>b</i> ₂	<i>a</i> ₂	<i>b</i> ₂	<i>a</i> ₂	<i>b</i> ₂
Jan.	- .1	+ .2	- .2	+ .2	- .2	+ .2	- .2	+ .1	- .3	.0	- .3	.0
Feb.	.0	+ .4	- .1	+ .4	- .2	+ .3	- .3	+ .2	- .3	+ .2	- .4	+ .1
Mar.	+ .1	+ .4	.0	+ .4	- .1	+ .4	- .2	+ .4	- .3	+ .3	- .4	+ .2
Apr.	+ .2	+ .4	+ .1	+ .5	.0	+ .5	- .1	+ .5	- .2	+ .4	- .3	+ .4
May	+ .4	+ .3	+ .3	+ .4	+ .2	+ .5	.0	+ .5	- .1	+ .5	- .2	+ .4
June	+ .4	+ .2	+ .3	+ .3	+ .3	+ .4	+ .2	+ .4	0	+ .4	- .1	+ .4
July	+ .4	.0	+ .3	+ .1	+ .3	+ .2	+ .2	+ .3	+ .2	+ .3	+ .1	+ .4
Aug.	+ .3	- .1	+ .3	.0	+ .3	.0	+ .3	+ .1	+ .2	+ .2	+ .2	+ .2
Sept.	+ .1	- .2	+ .1	- .2	+ .2	- .1	+ .2	- .1	+ .2	.0	+ .2	.0
Oct.	- .1	- .2	.0	- .2	.0	- .2	+ .1	- .2	+ .1	- .2	+ .2	- .2
Nov.	- .3	- .1	- .2	- .2	- .2	- .3	- .1	- .3	.0	- .3	+ .1	- .3
Dec.	- .4	.0	- .4	- .1	- .3	- .2	- .3	- .3	- .2	- .3	- .1	- .4

Latitude = Corrected observed altitude of Polaris + *a*₀ + *a*₁ + *a*₂Azimuth of Polaris = $\frac{b_0 + b_1 + b_2}{\cos \text{Latitude}}$

Table 12. To Determine Latitude and Azimuth From Polaris, 1975 — Continued

L.S.T.	18 ^b		19 ^b		20 ^b		21 ^b		22 ^b		23 ^b	
	<i>a</i> ₀	<i>b</i> ₀	<i>a</i> ₀	<i>b</i> ₀	<i>a</i> ₀	<i>b</i> ₀	<i>a</i> ₀	<i>b</i> ₀	<i>a</i> ₀	<i>b</i> ₀	<i>a</i> ₀	<i>b</i> ₀
m												
0	+27.4	+42.6	+15.5	+48.3	+ 2.4	+50.7	-10.8	+49.7	-23.3	+45.3	-34.2	+37.7
3	26.9	42.9	14.8	48.5	1.8	50.8	11.4	49.6	23.9	45.0	34.7	37.3
6	26.3	43.3	14.2	48.7	1.1	50.8	12.1	49.5	24.5	44.7	35.2	36.8
9	25.7	43.6	13.6	48.8	+ 0.4	50.8	12.7	49.3	25.1	44.4	35.7	36.4
12	25.2	43.9	12.9	49.0	- 0.2	50.8	13.4	49.1	25.6	44.1	36.2	35.9
15	+24.6	+44.3	+12.3	+49.2	- 0.9	+50.8	-14.0	+49.0	-26.2	+43.7	-36.6	+35.4
18	24.0	44.6	11.6	49.4	1.5	50.8	14.7	48.8	26.8	43.4	37.1	34.9
21	23.4	44.9	11.0	49.5	2.2	50.8	15.3	48.6	27.4	43.0	37.6	34.4
24	22.8	45.2	10.3	49.7	2.9	50.7	15.9	48.4	27.9	42.7	38.0	33.7
27	22.2	45.5	9.7	49.8	3.5	50.7	16.6	48.2	28.5	42.3	38.4	33.4
30	+21.6	+45.8	+ 9.0	+49.9	- 4.2	+50.7	-17.2	+48.0	-29.0	+41.9	-38.9	+32.9
33	21.0	46.1	8.4	50.0	4.9	50.6	17.8	47.7	29.6	41.5	39.3	32.4
36	20.4	46.4	7.7	50.1	5.5	50.6	18.4	47.5	30.1	41.1	39.7	31.9
39	19.8	46.6	7.1	50.2	6.2	50.5	19.1	47.2	30.6	40.7	40.1	31.4
42	19.2	46.9	6.4	50.3	6.9	50.4	19.7	47.0	31.2	40.3	40.5	30.8
45	+18.6	+47.1	+ 5.8	+50.4	- 7.5	+50.3	-20.3	+46.7	-31.7	+39.9	-40.9	+30.3
48	18.0	47.4	5.1	50.5	8.2	50.2	20.9	46.5	32.2	39.5	41.3	29.7
51	17.4	47.6	4.4	50.6	8.8	50.1	21.5	46.2	32.7	39.1	41.7	29.2
54	16.7	47.8	3.8	50.6	9.5	50.0	22.1	45.9	33.2	38.6	42.1	28.6
57	16.1	48.1	3.1	50.7	10.1	49.9	22.7	45.6	33.7	38.2	42.5	28.1
60	+15.5	+48.3	+ 2.4	+50.7	-10.8	+49.7	-23.3	+45.3	-34.2	+37.7	-42.8	+27.5
Lat.	<i>a</i> ₁	<i>b</i> ₁	<i>a</i> ₁	<i>b</i> ₁	<i>a</i> ₁	<i>b</i> ₁	<i>a</i> ₁	<i>b</i> ₁	<i>a</i> ₁	<i>b</i> ₁	<i>a</i> ₁	<i>b</i> ₁
°												
0	-.4	+.3	-.4	+.1	-.4	-.1	-.4	-.3	-.3	-.4	-.2	-.4
10	-.3	+.3	-.4	+.1	-.4	-.1	-.3	-.2	-.3	-.4	-.2	-.4
20	-.3	+.2	-.3	+.1	-.3	-.1	-.3	-.2	-.2	-.3	-.1	-.3
30	-.2	+.2	-.2	+.1	-.2	.0	-.2	-.1	-.2	-.2	-.1	-.2
40	-.1	+.1	-.1	.0	-.1	.0	-.1	-.1	-.1	-.1	-.1	-.1
45	-.1	+.1	-.1	.0	-.1	.0	-.1	.0	.0	-.1	.0	-.1
50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
55	+.1	-.1	+.1	.0	+.1	.0	+.1	+.1	+.1	+.1	.0	+.1
60	+.2	-.2	+.2	-.1	+.2	.0	+.2	+.1	+.1	+.2	+.1	+.2
62	+.2	-.2	+.3	-.1	+.3	.0	+.2	+.2	+.2	+.2	+.1	+.3
64	+.3	-.2	+.3	-.1	+.3	+.1	+.3	+.2	+.2	+.3	+.1	+.3
66	+.3	-.3	+.4	-.1	+.4	+.1	+.3	+.3	+.3	+.4	+.2	+.4
Month	<i>a</i> ₂	<i>b</i> ₂	<i>a</i> ₂	<i>b</i> ₂	<i>a</i> ₂	<i>b</i> ₂	<i>a</i> ₂	<i>b</i> ₂	<i>a</i> ₂	<i>b</i> ₂	<i>a</i> ₂	<i>b</i> ₂
Jan.	-.2	-.1	-.2	-.2	-.2	-.2	-.1	-.2	.0	-.3	.0	-.3
Feb.	-.4	.0	-.4	-.1	-.3	-.2	-.2	-.3	-.2	-.3	-.1	-.4
Mar.	-.4	+.1	-.4	.0	-.4	-.1	-.4	-.2	-.3	-.3	-.2	-.4
Apr.	-.4	+.2	-.5	+.1	-.5	.0	-.5	-.1	-.4	-.2	-.4	-.3
May	-.3	+.4	-.4	+.3	-.5	+.2	-.5	.0	-.5	-.1	-.4	-.2
June	-.2	+.4	-.3	+.3	-.4	+.3	-.4	+.2	-.4	.0	-.4	-.1
July	.0	+.4	-.1	+.3	-.2	+.3	-.3	+.2	-.3	+.2	-.4	+.1
Aug.	+.1	+.3	.0	+.3	.0	+.3	-.1	+.3	-.2	+.2	-.2	+.2
Sept.	+.2	+.1	+.2	+.1	+.1	+.2	+.1	+.2	.0	+.2	.0	+.2
Oct.	+.2	-.1	+.2	.0	+.2	.0	+.2	+.1	+.2	+.1	+.2	+.2
Nov.	+.1	-.3	+.2	-.2	+.3	-.2	+.3	-.1	+.3	.0	+.3	+.1
Dec.	.0	-.4	+.1	-.4	+.2	-.3	+.3	-.3	+.3	-.2	+.4	-.1

Latitude = Corrected observed altitude of Polaris + *a*₀ + *a*₁ + *a*₂Azimuth of Polaris = $\frac{b_0 + b_1 + b_2}{\cos \text{Latitude}}$

TABLE 13. Grid Azimuth Correction, Simultaneous Observation

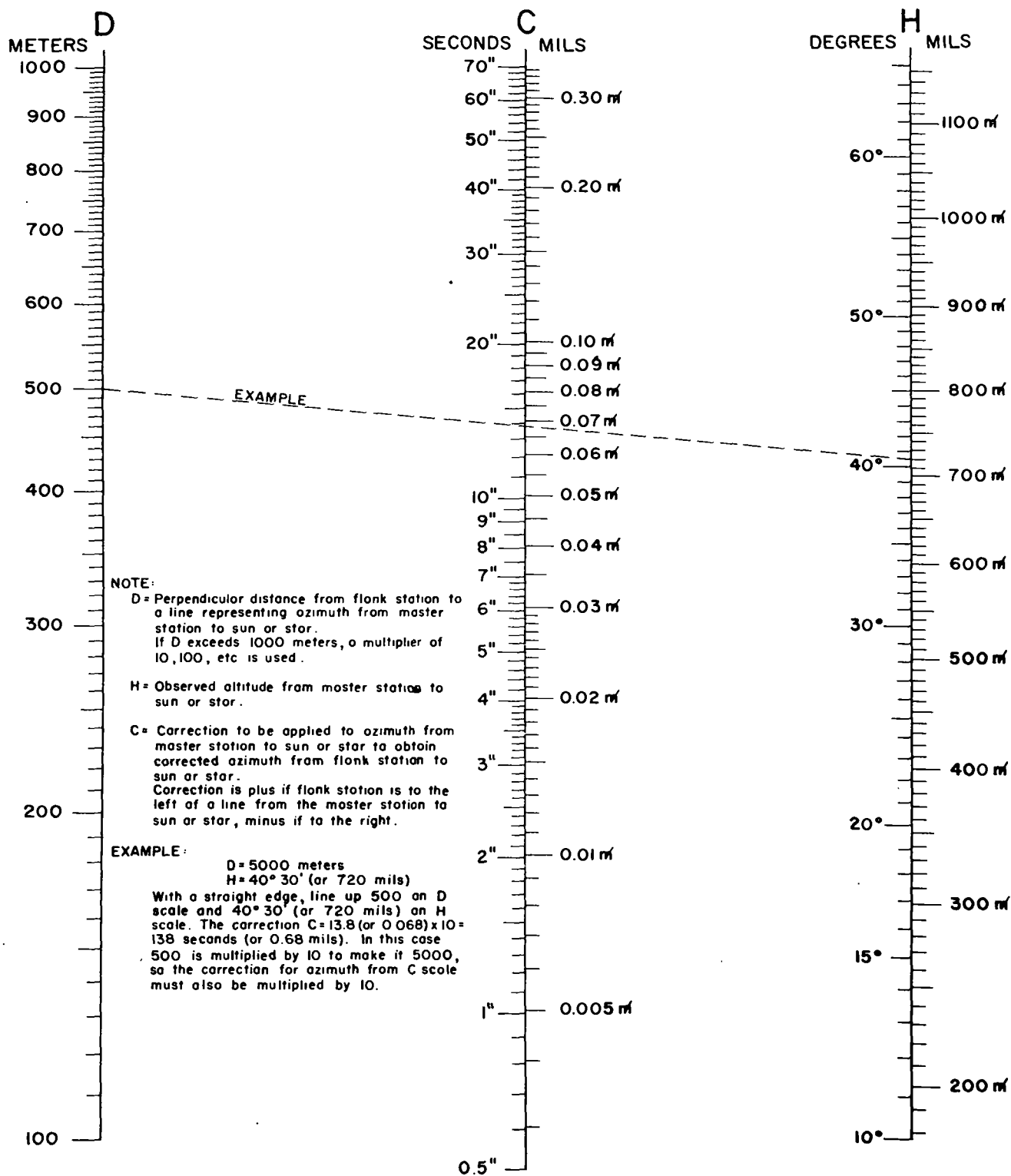


Table 14. Five Place Logarithms of Functions of Angles in Mils

0000-3200 and 1600-4800

0000 3200	L. sin	L. tan	L. cot	L. cos	
1600 4800	L. cos	L. cot	L. tan	L. sin	
00				.00000	100
01	6.99200	6.99200	3.00800	.00000	99
02	7.29303	7.29303	2.70697	.00000	98
03	7.46912	7.46912	2.53088	.00000	97
04	7.59406	7.59406	2.40594	.00000	96
05	7.69097	7.69097	2.30903	9.99999	95
06	7.77015	7.77016	2.22984	9.99999	94
07	7.83709	7.83710	2.16290	9.99999	93
08	7.89509	7.89510	2.10490	9.99999	92
09	7.94624	7.94625	2.05375	9.99998	91
10	7.99199	7.99201	2.00799	9.99998	90
11	8.03338	8.03341	1.96659	9.99997	89
12	8.07117	8.07120	1.92880	9.99997	88
13	8.10593	8.10597	1.89403	9.99996	87
14	8.13811	8.13816	1.86184	9.99996	86
15	8.16808	8.16812	1.83188	9.99995	85
16	8.19610	8.19616	1.80384	9.99995	84
17	8.22243	8.22249	1.77751	9.99994	83
18	8.24725	8.24732	1.75268	9.99993	82
19	8.27073	8.27080	1.72920	9.99992	81
20	8.29300	8.29309	1.70691	9.99992	80
21	8.31419	8.31428	1.68572	9.99991	79
22	8.33439	8.33449	1.66551	9.99990	78
23	8.35369	8.35380	1.64620	9.99989	77
24	8.37217	8.37229	1.62771	9.99988	76
25	8.38990	8.39003	1.60997	9.99987	75
26	8.40693	8.40707	1.59293	9.99986	74
27	8.42331	8.42347	1.57653	9.99985	73
28	8.43910	8.43927	1.56073	9.99984	72
29	8.45434	8.45452	1.54548	9.99982	71
30	8.46906	8.46925	1.53075	9.99981	70
31	8.48329	8.48350	1.51650	9.99980	69
32	8.49708	8.49729	1.50271	9.99979	68
33	8.51044	8.51067	1.48933	9.99977	67
34	8.52340	8.52364	1.47636	9.99976	66
35	8.53598	8.53624	1.46376	9.99974	65
36	8.54821	8.54848	1.45152	9.99973	64
37	8.56011	8.56039	1.43961	9.99971	63
38	8.57168	8.57198	1.42802	9.99970	62
39	8.58296	8.58328	1.41672	9.99968	61
40	8.59395	8.59428	1.40572	9.99966	60
41	8.60467	8.60502	1.39498	9.99965	59
42	8.61513	8.61550	1.38450	9.99963	58
43	8.62534	8.62573	1.37427	9.99961	57
44	8.63532	8.63572	1.36428	9.99959	56
45	8.64507	8.64550	1.35450	9.99958	55
46	8.65461	8.65505	1.34495	9.99956	54
47	8.66394	8.66441	1.33559	9.99954	53
48	8.67308	8.67356	1.32644	9.99952	52
49	8.68203	8.68253	1.31747	9.99950	51
50	8.69080	8.69132	1.30868	9.99948	50
	L. sin	L. tan	L. cot	L. cos	6800 3100
	L. cos	L. cot	L. tan	L. sin	4700 1500

Table 14. Five Place Logarithms of Functions of Angles in Mils—Continued
0000-3200 and 1600-4800—Continued

0000 3200	L. sin	L. tan	L. cot	L. cos	
1600 4800	L. cos	L. cot	L. tan	L. sin	
51	8.69939	8.69993	1.30007	9.99946	49
52	8.70781	8.70838	1.29162	9.99943	48
53	8.71608	8.71667	1.28333	9.99941	47
54	8.72419	8.72480	1.27520	9.99939	46
55	8.73215	8.73278	1.26722	9.99937	45
56	8.73997	8.74063	1.25937	9.99934	44
57	8.74765	8.74833	1.25167	9.99932	43
58	8.75519	8.75590	1.24410	9.99930	42
59	8.76261	8.76334	1.23666	9.99927	41
60	8.76990	8.77065	1.22935	9.99925	40
61	8.77707	8.77785	1.22215	9.99922	39
62	8.78412	8.78493	1.21507	9.99920	38
63	8.79106	8.79189	1.20811	9.99917	37
64	8.79789	8.79875	1.20125	9.99914	36
65	8.80462	8.80550	1.19450	9.99912	35
66	8.81124	8.81215	1.18785	9.99909	34
67	8.81776	8.81870	1.18130	9.99906	33
68	8.82419	8.82515	1.17485	9.99903	32
69	8.83052	8.83151	1.16849	9.99900	31
70	8.83676	8.83778	1.16222	9.99897	30
71	8.84291	8.84396	1.15604	9.99894	29
72	8.84897	8.85006	1.14994	9.99891	28
73	8.85495	8.85607	1.14393	9.99888	27
74	8.86085	8.86200	1.13800	9.99885	26
75	8.86667	8.86785	1.13215	9.99882	25
76	8.87241	8.87362	1.12638	9.99879	24
77	8.87808	8.87932	1.12068	9.99876	23
78	8.88367	8.88494	1.11506	9.99873	22
79	8.88919	8.89050	1.10950	9.99869	21
80	8.89464	8.89598	1.10402	9.99866	20
81	8.90003	8.90140	1.09860	9.99863	19
82	8.90534	8.90675	1.09325	9.99859	18
83	8.91060	8.91204	1.08796	9.99856	17
84	8.91579	8.91727	1.08273	9.99852	16
85	8.92091	8.92243	1.07757	9.99849	15
86	8.92598	8.92753	1.07247	9.99845	14
87	8.93099	8.93258	1.06742	9.99841	13
88	8.93594	8.93756	1.06244	9.99838	12
89	8.94084	8.94250	1.05750	9.99834	11
90	8.94568	8.94737	1.05263	9.99830	10
91	8.95046	8.95220	1.04780	9.99826	09
92	8.95520	8.95697	1.04303	9.99823	08
93	8.95988	8.96169	1.03831	9.99819	07
94	8.96451	8.96636	1.03364	9.99815	06
95	8.96909	8.97099	1.02901	9.99811	05
96	8.97363	8.97556	1.02444	9.99807	04
97	8.97812	8.98009	1.01991	9.99803	03
98	8.98256	8.98457	1.01543	9.99799	02
99	8.98695	8.98901	1.01100	9.99795	01
100	8.99130	8.99340	1.00660	9.99790	00
	L. sin	L. tan	L. cot	L. cos	0000 3200
	L. cos	L. cot	L. tan	L. sin	4800 1600

Table 14. Five Place Logarithms of Functions of Angles in Mills—Continued
0100-8800 and 1700-4900

0100 8800	L. sin	L. tan	L. cot	L. cos	
1700 4900	L. cos	L. cot	L. tan	L. sin	
00	8.99180	8.99840	1.00660	9.99790	100
01	8.99561	8.99775	1.00225	9.99786	99
02	8.99987	9.00206	.99794	9.99782	98
03	9.00410	9.00682	.99368	9.99778	97
04	9.00828	9.01055	.98945	9.99773	96
05	9.01242	9.01478	.98527	9.99769	95
06	9.01652	9.01888	.98112	9.99764	94
07	9.02058	9.02299	.97701	9.99760	93
08	9.02461	9.02706	.97294	9.99755	92
09	9.02860	9.03109	.96891	9.99751	91
10	9.03255	9.03509	.96491	9.99746	90
11	9.03646	9.03905	.96095	9.99742	89
12	9.04034	9.04297	.95703	9.99737	88
13	9.04419	9.04687	.95313	9.99732	87
14	9.04800	9.05072	.94928	9.99727	86
15	9.05177	9.05455	.94545	9.99723	85
16	9.05552	9.05834	.94166	9.99718	84
17	9.05928	9.06210	.93790	9.99713	83
18	9.06291	9.06588	.93417	9.99708	82
19	9.06656	9.06958	.93047	9.99703	81
20	9.07018	9.07320	.92680	9.99698	80
21	9.07376	9.07683	.92317	9.99693	79
22	9.07732	9.08044	.91956	9.99688	78
23	9.08085	9.08402	.91598	9.99683	77
24	9.08435	9.08757	.91243	9.99677	76
25	9.08782	9.09110	.90890	9.99672	75
26	9.09126	9.09459	.90541	9.99667	74
27	9.09468	9.09806	.90194	9.99662	73
28	9.09807	9.10150	.89850	9.99656	72
29	9.10143	9.10492	.89508	9.99651	71
30	9.10476	9.10831	.89169	9.99645	70
31	9.10807	9.11167	.88833	9.99640	69
32	9.11136	9.11501	.88499	9.99634	68
33	9.11462	9.11833	.88167	9.99629	67
34	9.11785	9.12162	.87838	9.99623	66
35	9.12106	9.12489	.87511	9.99617	65
36	9.12425	9.12813	.87187	9.99612	64
37	9.12741	9.13135	.86865	9.99606	63
38	9.13055	9.13455	.86545	9.99600	62
39	9.13367	9.13772	.86228	9.99594	61
40	9.13676	9.14087	.85913	9.99588	60
41	9.13983	9.14401	.85599	9.99583	59
42	9.14288	9.14711	.85289	9.99577	58
43	9.14591	9.15020	.84980	9.99571	57
44	9.14891	9.15327	.84673	9.99565	56
45	9.15190	9.15632	.84368	9.99558	55
46	9.15486	9.15934	.84066	9.99552	54
47	9.15781	9.16235	.83765	9.99546	53
48	9.16073	9.16533	.83467	9.99540	52
49	9.16364	9.16830	.83170	9.99534	51
50	9.16652	9.17125	.82875	9.99527	50
	L. sin	L. tan	L. cot	L. cos	8200 3000
	L. cos	L. cot	L. tan	L. sin	4800 1400

Table 14. Five Place Logarithms of Functions of Angles in Mils—Continued

0100-3300 and 1700-4900—Continued

0100 3300	L. sin	L. tan	L. cot	L. cos	
1700 4900	L. cos	L. cot	L. tan	L. sin	
51	9.16938	9.17417	.82583	9.99521	49
52	9.17223	9.17708	.82292	9.99515	48
53	9.17506	9.17997	.82003	9.99508	47
54	9.17786	9.18285	.81715	9.99502	46
55	9.18065	9.18570	.81430	9.99495	45
56	9.18343	9.18854	.81146	9.99489	44
57	9.18618	9.19136	.80864	9.99482	43
58	9.18891	9.19416	.80584	9.99475	42
59	9.19163	9.19694	.80306	9.99469	41
60	9.19433	9.19971	.80029	9.99462	40
61	9.19702	9.20246	.79754	9.99455	39
62	9.19968	9.20520	.79480	9.99448	38
63	9.20233	9.20792	.79208	9.99442	37
64	9.20497	9.21062	.78938	9.99435	36
65	9.20758	9.21331	.78669	9.99428	35
66	9.21018	9.21598	.78402	9.99421	34
67	9.21277	9.21863	.78137	9.99414	33
68	9.21534	9.22127	.77873	9.99407	32
69	9.21789	9.22390	.77610	9.99399	31
70	9.22043	9.22651	.77349	9.99392	30
71	9.22295	9.22910	.77090	9.99385	29
72	9.22546	9.23168	.76832	9.99378	28
73	9.22796	9.23425	.76575	9.99371	27
74	9.23043	9.23680	.76320	9.99363	26
75	9.23290	9.23934	.76066	9.99356	25
76	9.23535	9.24186	.75814	9.99348	24
77	9.23779	9.24438	.75562	9.99341	23
78	9.24021	9.24687	.75313	9.99333	22
79	9.24262	9.24936	.75064	9.99326	21
80	9.24501	9.25183	.74817	9.99318	20
81	9.24739	9.25428	.74572	9.99311	19
82	9.24976	9.25673	.74327	9.99303	18
83	9.25211	9.25916	.74084	9.99295	17
84	9.25445	9.26158	.73842	9.99288	16
85	9.25678	9.26398	.73602	9.99280	15
86	9.25910	9.26638	.73362	9.99272	14
87	9.26140	9.26876	.73124	9.99264	13
88	9.26369	9.27113	.72887	9.99256	12
89	9.26597	9.27349	.72651	9.99248	11
90	9.26823	9.27583	.72417	9.99240	10
91	9.27049	9.27817	.72183	9.99232	09
92	9.27273	9.28049	.71951	9.99224	08
93	9.27496	9.28280	.71720	9.99216	07
94	9.27717	9.28510	.71490	9.99208	06
95	9.27938	9.28739	.71261	9.99199	05
96	9.28157	9.28966	.71034	9.99191	04
97	9.28376	9.29193	.70807	9.99183	03
98	9.28593	9.29418	.70582	9.99174	02
99	9.28809	9.29643	.70357	9.99166	01
100	9.29024	9.29866	.70134	9.99157	00
	L. sin	L. tan	L. cot	L. cos	6200 3000
	L. cos	L. cot	L. tan	L. sin	4800 1400

Table 14. Five Place Logarithms of Functions of Angles in Mils—Continued

0200-3400 and 1800-5000

0200 3400	L. sin	L. tan	L. cot	L. cos	
1800 5000	L. cos	L. cot	L. tan	L. sin	
00	9.29024	9.29866	.70134	9.99157	100
01	9.29237	9.30088	.69912	9.99149	99
02	9.29450	9.30310	.69690	9.99140	98
03	9.29662	9.30530	.69470	9.99132	97
04	9.29872	9.30749	.69251	9.99123	96
05	9.30082	9.30967	.69033	9.99114	95
06	9.30290	9.31185	.68815	9.99106	94
07	9.30498	9.31401	.68599	9.99097	93
08	9.30704	9.31616	.68384	9.99088	92
09	9.30909	9.31830	.68170	9.99079	91
10	9.31114	9.32043	.67957	9.99070	90
11	9.31317	9.32256	.67744	9.99061	89
12	9.31520	9.32467	.67533	9.99052	88
13	9.31721	9.32678	.67322	9.99043	87
14	9.31921	9.32887	.67113	9.99034	86
15	9.32121	9.33096	.66904	9.99025	85
16	9.32319	9.33303	.66697	9.99016	84
17	9.32517	9.33510	.66490	9.99007	83
18	9.32714	9.33716	.66284	9.98998	82
19	9.32909	9.33921	.66079	9.98988	81
20	9.33104	9.34125	.65875	9.98979	80
21	9.33298	9.34328	.65672	9.98970	79
22	9.33491	9.34531	.65469	9.98960	78
23	9.33683	9.34732	.65268	9.98951	77
24	9.33874	9.34933	.65067	9.98941	76
25	9.34064	9.35133	.64867	9.98932	75
26	9.34254	9.35332	.64668	9.98922	74
27	9.34442	9.35530	.64470	9.98912	73
28	9.34630	9.35727	.64273	9.98903	72
29	9.34817	9.35924	.64076	9.98893	71
30	9.35003	9.36120	.63880	9.98883	70
31	9.35188	9.36315	.63685	9.98873	69
32	9.35373	9.36509	.63491	9.98864	68
33	9.35556	9.36702	.63298	9.98854	67
34	9.35739	9.36895	.63105	9.98844	66
35	9.35921	9.37087	.62913	9.98834	65
36	9.36102	9.37278	.62722	9.98824	64
37	9.36282	9.37469	.62531	9.98814	63
38	9.36462	9.37658	.62342	9.98804	62
39	9.36641	9.37847	.62153	9.98793	61
40	9.36819	9.38035	.61965	9.98783	60
41	9.36996	9.38223	.61777	9.98773	59
42	9.37172	9.38410	.61590	9.98763	58
43	9.37348	9.38596	.61404	9.98752	57
44	9.37523	9.38781	.61219	9.98742	56
45	9.37697	9.38966	.61034	9.98731	55
46	9.37870	9.39150	.60850	9.98721	54
47	9.38043	9.39333	.60667	9.98710	53
48	9.38215	9.39515	.60485	9.98700	52
49	9.38387	9.39697	.60303	9.98689	51
50	9.38557	9.39879	.60121	9.98679	50
	L. sin	L. tan	L. cot	L. cos	6100 2900
	L. cos	L. cot	L. tan	L. sin	4500 1300

Table 14. Five Place Logarithms of Functions of Angles in Mils—Continued

0200-3400 and 1800-5000—Continued

0200 3400	L. sin	L. tan	L. cot	L. cos	
1800 5000	L. cos	L. cot	L. tan	L. sin	
51	9.38727	9.40059	.59941	9.98668	49
52	9.38896	9.40239	.59761	9.98657	48
53	9.39065	9.40418	.59582	9.98646	47
54	9.39232	9.40597	.59403	9.98636	46
55	9.39399	9.40775	.59225	9.98625	45
56	9.39566	9.40952	.59048	9.98614	44
57	9.39732	9.41129	.58871	9.98603	43
58	9.39897	9.41305	.58695	9.98592	42
59	9.40061	9.41480	.58520	9.98581	41
60	9.40225	9.41655	.58345	9.98570	40
61	9.40388	9.41829	.58171	9.98558	39
62	9.40550	9.42003	.57997	9.98547	38
63	9.40712	9.42176	.57824	9.98536	37
64	9.40873	9.42348	.57652	9.98525	36
65	9.41034	9.42520	.57480	9.98513	35
66	9.41193	9.42691	.57309	9.98502	34
67	9.41353	9.42862	.57138	9.98491	33
68	9.41511	9.43032	.56968	9.98479	32
69	9.41669	9.43202	.56798	9.98468	31
70	9.41827	9.43371	.56629	9.98456	30
71	9.41983	9.43539	.56461	9.98444	29
72	9.42140	9.43707	.56293	9.98433	28
73	9.42295	9.43874	.56126	9.98421	27
74	9.42450	9.44041	.55959	9.98409	26
75	9.42604	9.44207	.55793	9.98398	25
76	9.42758	9.44372	.55628	9.98386	24
77	9.42911	9.44537	.55463	9.98374	23
78	9.43064	9.44702	.55298	9.98362	22
79	9.43216	9.44866	.55134	9.98350	21
80	9.43367	9.45029	.54971	9.98338	20
81	9.43518	9.45192	.54808	9.98326	19
82	9.43669	9.45355	.54645	9.98314	18
83	9.43818	9.45517	.54483	9.98302	17
84	9.43968	9.45678	.54322	9.98290	16
85	9.44116	9.45839	.54161	9.98277	15
86	9.44264	9.45999	.54001	9.98265	14
87	9.44412	9.46159	.53841	9.98253	13
88	9.44559	9.46319	.53681	9.98240	12
89	9.44706	9.46478	.53522	9.98228	11
90	9.44851	9.46636	.53364	9.98216	10
91	9.44997	9.46794	.53206	9.98203	09
92	9.45142	9.46951	.53049	9.98190	08
93	9.45286	9.47108	.52892	9.98178	07
94	9.45430	9.47265	.52735	9.98165	06
95	9.45573	9.47421	.52579	9.98153	05
96	9.45716	9.47576	.52424	9.98140	04
97	9.45858	9.47731	.52269	9.98127	03
98	9.46000	9.47886	.52114	9.98114	02
99	9.46142	9.48040	.51960	9.98101	01
100	9.46282	9.48194	.51806	9.98088	00
	L. sin	L. tan	L. cot	L. cos	6100 2900
	L. cos	L. cot	L. tan	L. sin	4600 1800

Table 14. Five Place Logarithms of Functions of Angles in Mils—Continued

0300-3500 and 1900-5100

0300 3500	L. sin	L. tan	L. cot	L. cos	
1900 5100	L. cos	L. cot	L. tan	L. sin	
00	9.46282	9.48194	.51806	9.98088	100
01	9.46423	9.48347	.51653	9.98076	99
02	9.46563	9.48500	.51500	9.98063	98
03	9.46702	9.48652	.51348	9.98049	97
04	9.46841	9.48804	.51196	9.98036	96
05	9.46979	9.48956	.51044	9.98023	95
06	9.47117	9.49107	.50893	9.98010	94
07	9.47254	9.49257	.50743	9.97997	93
08	9.47391	9.49408	.50592	9.97984	92
09	9.47528	9.49557	.50443	9.97970	91
10	9.47664	9.49707	.50293	9.97957	90
11	9.47799	9.49856	.50144	9.97943	89
12	9.47934	9.50004	.49996	9.97930	88
13	9.48069	9.50152	.49848	9.97916	87
14	9.48203	9.50300	.49700	9.97903	86
15	9.48337	9.50447	.49553	9.97889	85
16	9.48470	9.50594	.49406	9.97876	84
17	9.48603	9.50741	.49259	9.97862	83
18	9.48735	9.50887	.49113	9.97848	82
19	9.48867	9.51032	.48968	9.97834	81
20	9.48998	9.51178	.48822	9.97821	80
21	9.49129	9.51322	.48678	9.97807	79
22	9.49260	9.51467	.48533	9.97793	78
23	9.49390	9.51611	.48389	9.97779	77
24	9.49520	9.51755	.48245	9.97765	76
25	9.49649	9.51898	.48102	9.97751	75
26	9.49778	9.52041	.47959	9.97737	74
27	9.49906	9.52184	.47816	9.97723	73
28	9.50034	9.52326	.47674	9.97708	72
29	9.50162	9.52468	.47532	9.97694	71
30	9.50289	9.52609	.47391	9.97680	70
31	9.50416	9.52750	.47250	9.97665	69
32	9.50542	9.52891	.47109	9.97651	68
33	9.50668	9.53031	.46969	9.97637	67
34	9.50794	9.53171	.46829	9.97622	66
35	9.50919	9.53311	.46689	9.97608	65
36	9.51043	9.53450	.46550	9.97593	64
37	9.51168	9.53589	.46411	9.97578	63
38	9.51292	9.53728	.46272	9.97564	62
39	9.51415	9.53866	.46134	9.97549	61
40	9.51538	9.54004	.45996	9.97534	60
41	9.51661	9.54142	.45858	9.97519	59
42	9.51784	9.54279	.45721	9.97505	58
43	9.51906	9.54416	.45584	9.97490	57
44	9.52027	9.54552	.45448	9.97475	56
45	9.52148	9.54689	.45311	9.97460	55
46	9.52269	9.54824	.45176	9.97445	54
47	9.52390	9.54960	.45040	9.97430	53
48	9.52510	9.55095	.44905	9.97414	52
49	9.52629	9.55230	.44770	9.97399	51
50	9.52749	9.55365	.44635	9.97384	50
	L. sin	L. tan	L. cot	L. cos	6000 2800
	L. cos	L. cot	L. tan	L. sin	4400 1200

Table 14. Five Place Logarithms of Functions of Angles in Mils—Continued
0300-3500 and 1900-5100—Continued

0300 3500	L. sin	L. tan	L. cot	L. cos	
1900 5100	L. cos	L. cot	L. tan	L. sin	
51	9.52868	9.55490	.44501	9.97369	49
52	9.52986	9.55633	.44367	9.97353	48
53	9.53105	9.55767	.44233	9.97338	47
54	9.53223	9.55900	.44100	9.97323	46
55	9.53340	9.56033	.43967	9.97307	45
56	9.53457	9.56166	.43834	9.97292	44
57	9.53574	9.56298	.43702	9.97276	43
58	9.53690	9.56430	.43570	9.97261	42
59	9.53807	9.56562	.43438	9.97245	41
60	9.53922	9.56693	.43307	9.97229	40
61	9.54038	9.56824	.43176	9.97213	39
62	9.54153	9.56955	.43045	9.97198	38
63	9.54267	9.57086	.42914	9.97182	37
64	9.54382	9.57216	.42784	9.97166	36
65	9.54496	9.57346	.42654	9.97150	35
66	9.54610	9.57476	.42524	9.97134	34
67	9.54723	9.57605	.42395	9.97118	33
68	9.54836	9.57734	.42266	9.97102	32
69	9.54949	9.57863	.42137	9.97086	31
70	9.55061	9.57991	.42009	9.97069	30
71	9.55173	9.58120	.41880	9.97053	29
72	9.55285	9.58248	.41752	9.97037	28
73	9.55396	9.58375	.41625	9.97021	27
74	9.55507	9.58503	.41497	9.97004	26
75	9.55618	9.58630	.41370	9.96988	25
76	9.55728	9.58757	.41243	9.96971	24
77	9.55838	9.58883	.41117	9.96955	23
78	9.55948	9.59009	.40991	9.96938	22
79	9.56057	9.59135	.40865	9.96922	21
80	9.56166	9.59261	.40739	9.96905	20
81	9.56275	9.59387	.40613	9.96888	19
82	9.56383	9.59512	.40488	9.96872	18
83	9.56492	9.59637	.40363	9.96855	17
84	9.56599	9.59762	.40238	9.96838	16
85	9.56707	9.59886	.40114	9.96821	15
86	9.56814	9.60010	.39990	9.96804	14
87	9.56921	9.60134	.39866	9.96787	13
88	9.57028	9.60258	.39742	9.96770	12
89	9.57134	9.60381	.39619	9.96753	11
90	9.57240	9.60504	.39496	9.96736	10
91	9.57346	9.60627	.39373	9.96718	09
92	9.57451	9.60750	.39250	9.96701	08
93	9.57556	9.60872	.39128	9.96684	07
94	9.57661	9.60995	.39005	9.96667	06
95	9.57766	9.61116	.38883	9.96649	05
96	9.57870	9.61238	.38762	9.96632	04
97	9.57974	9.61360	.38640	9.96614	03
98	9.58078	9.61481	.38519	9.96597	02
99	9.58181	9.61602	.38398	9.96579	01
100	9.58284	9.61722	.38278	9.96562	00
	L. sin	L. tan	L. cot	L. cos	0000 2800
	L. cos	L. cot	L. tan	L. sin	4400 1200

Table 14. Five Place Logarithms of Functions of Angles in Mils—Continued

0400-3600 and 2000-5200

0400 3600	L. sin	L. tan	L. cot	L. cos	
2000 5200	L. cos	L. cot	L. tan	L. sin	
00	9.58284	9.61722	.38278	9.96562	100
01	9.58387	9.61843	.38157	9.96544	99
02	9.58489	9.61963	.38037	9.96526	98
03	9.58591	9.62083	.37917	9.96508	97
04	9.58693	9.62203	.37797	9.96490	96
05	9.58795	9.62322	.37678	9.96473	95
06	9.58896	9.62442	.37558	9.96455	94
07	9.58998	9.62561	.37439	9.96437	93
08	9.59098	9.62680	.37320	9.96419	92
09	9.59199	9.62798	.37202	9.96401	91
10	9.59299	9.62917	.37083	9.96382	90
11	9.59399	9.63035	.36965	9.96364	89
12	9.59499	9.63153	.36847	9.96346	88
13	9.59598	9.63271	.36729	9.96328	87
14	9.59698	9.63388	.36612	9.96309	86
15	9.59797	9.63505	.36495	9.96291	85
16	9.59895	9.63623	.36377	9.96273	84
17	9.59994	9.63739	.36261	9.96254	83
18	9.60092	9.63856	.36144	9.96236	82
19	9.60190	9.63973	.36027	9.96217	81
20	9.60287	9.64089	.35911	9.96198	80
21	9.60385	9.64205	.35795	9.96180	79
22	9.60482	9.64321	.35679	9.96161	78
23	9.60578	9.64436	.35564	9.96142	77
24	9.60675	9.64552	.35448	9.96123	76
25	9.60771	9.64667	.35333	9.96105	75
26	9.60867	9.64782	.35218	9.96086	74
27	9.60963	9.64897	.35103	9.96067	73
28	9.61059	9.65011	.34989	9.96048	72
29	9.61154	9.65126	.34874	9.96029	71
30	9.61249	9.65240	.34760	9.96009	70
31	9.61344	9.65354	.34646	9.95990	69
32	9.61438	9.65467	.34533	9.95971	68
33	9.61533	9.65581	.34419	9.95952	67
34	9.61627	9.65694	.34306	9.95932	66
35	9.61721	9.65808	.34192	9.95913	65
36	9.61814	9.65921	.34079	9.95894	64
37	9.61908	9.66033	.33967	9.95874	63
38	9.62001	9.66146	.33854	9.95855	62
39	9.62094	9.66258	.33742	9.95835	61
40	9.62186	9.66371	.33629	9.95815	60
41	9.62278	9.66483	.33517	9.95796	59
42	9.62371	9.66595	.33405	9.95776	58
43	9.62463	9.66706	.33294	9.95756	57
44	9.62554	9.66818	.33182	9.95736	56
45	9.62646	9.66929	.33071	9.95717	55
46	9.62737	9.67040	.32960	9.95697	54
47	9.62828	9.67151	.32849	9.95677	53
48	9.62918	9.67262	.32738	9.95657	52
49	9.63009	9.67372	.32628	9.95636	51
50	9.63099	9.67483	.32517	9.95616	50
	L. sin	L. tan	L. cot	L. cos	5900 2700
	L. cos	L. cot	L. tan	L. sin	4800 1100

Table 14. Five Place Logarithms of Functions of Angles in Mils—Continued
0400-3600 and 2000-5200—Continued

0400 3600	L. sin	L. tan	L. cot	L. cos	
2000 5200	L. cos	L. cot	L. tan	L. sin	
51	9.63189	9.67593	.32407	9.95596	49
52	9.63279	9.67703	.32297	9.95576	48
53	9.63369	9.67813	.32187	9.95556	47
54	9.63458	9.67923	.32077	9.95535	46
55	9.63547	9.68032	.31968	9.95515	45
56	9.63636	9.68142	.31858	9.95494	44
57	9.63725	9.68251	.31749	9.95474	43
58	9.63813	9.68360	.31640	9.95453	42
59	9.63901	9.68469	.31531	9.95433	41
60	9.63989	9.68577	.31423	9.95412	40
61	9.64077	9.68686	.31314	9.95391	39
62	9.64165	9.68794	.31206	9.95371	38
63	9.64252	9.68902	.31098	9.95350	37
64	9.64339	9.69010	.30990	9.95329	36
65	9.64426	9.69118	.30882	9.95308	35
66	9.64513	9.69226	.30774	9.95287	34
67	9.64599	9.69333	.30667	9.95266	33
68	9.64686	9.69441	.30559	9.95245	32
69	9.64772	9.69548	.30452	9.95224	31
70	9.64858	9.69655	.30345	9.95203	30
71	9.64943	9.69762	.30238	9.95181	29
72	9.65029	9.69868	.30132	9.95160	28
73	9.65114	9.69975	.30025	9.95139	27
74	9.65199	9.70081	.29919	9.95117	26
75	9.65284	9.70188	.29812	9.95096	25
76	9.65368	9.70294	.29706	9.95075	24
77	9.65453	9.70400	.29600	9.95053	23
78	9.65537	9.70505	.29495	9.95031	22
79	9.65621	9.70611	.29389	9.95010	21
80	9.65705	9.70717	.29283	9.94988	20
81	9.65788	9.70822	.29178	9.94966	19
82	9.65872	9.70927	.29073	9.94945	18
83	9.65955	9.71032	.28968	9.94923	17
84	9.66038	9.71137	.28863	9.94901	16
85	9.66121	9.71242	.28758	9.94879	15
86	9.66203	9.71346	.28654	9.94857	14
87	9.66286	9.71451	.28549	9.94835	13
88	9.66368	9.71555	.28445	9.94813	12
89	9.66450	9.71659	.28341	9.94790	11
90	9.66531	9.71763	.28237	9.94768	10
91	9.66613	9.71867	.28133	9.94746	09
92	9.66694	9.71971	.28029	9.94724	08
93	9.66776	9.72074	.27926	9.94701	07
94	9.66857	9.72178	.27822	9.94679	06
95	9.66937	9.72281	.27719	9.94656	05
96	9.67018	9.72384	.27616	9.94634	04
97	9.67098	9.72487	.27513	9.94611	03
98	9.67179	9.72590	.27410	9.94588	02
99	9.67259	9.72693	.27307	9.94566	01
100	9.67339	9.72796	.27204	9.94543	00
	L. sin	L. tan	L. cot	L. cos	5900
					5700
	L. cos	L. cot	L. tan	L. sin	4300
					1100

Table 1a. Five Place Logarithms of Functions of Angles in Mils—Continued

0500-3700 and 2100-5300

0500 3700	L. sin	L. tan	L. cot	L. cos	
2100 5300	L. cos	L. cot	L. tan	L. sin	
00	9.67339	9.72796	.27204	9.94548	100
01	9.67418	9.72898	.27102	9.94520	99
02	9.67498	9.73001	.26999	9.94497	98
03	9.67577	9.73103	.26897	9.94474	97
04	9.67656	9.73205	.26795	9.94451	96
05	9.67735	9.73307	.26693	9.94428	95
06	9.67814	9.73409	.26591	9.94405	94
07	9.67892	9.73510	.26490	9.94382	98
08	9.67971	9.73612	.26388	9.94359	92
09	9.68049	9.73713	.26287	9.94386	91
10	9.68127	9.73815	.26185	9.94312	90
11	9.68205	9.73916	.26084	9.94289	89
12	9.68282	9.74017	.25983	9.94266	88
13	9.68360	9.74118	.25882	9.94242	87
14	9.68347	9.74219	.25781	9.94219	86
15	9.68514	9.74319	.25681	9.94195	85
16	9.68591	9.74420	.25580	9.94171	84
17	9.68668	9.74520	.25480	9.94148	83
18	9.68745	9.74621	.25379	9.94124	82
19	9.68821	9.74721	.25279	9.94100	81
20	9.68897	9.74821	.25179	9.94076	80
21	9.68973	9.74921	.25079	9.94052	79
22	9.69049	9.75021	.24979	9.94028	78
23	9.69125	9.75120	.24880	9.94004	77
24	9.69200	9.75220	.24780	9.93980	76
25	9.69276	9.75319	.24681	9.93956	75
26	9.69351	9.75419	.24581	9.93932	74
27	9.69426	9.75518	.24482	9.93908	73
28	9.69501	9.75617	.24383	9.93884	72
29	9.69575	9.75716	.24284	9.93859	71
30	9.69650	9.75815	.24185	9.93835	70
31	9.69724	9.75914	.24086	9.93810	69
32	9.69798	9.76013	.23987	9.93786	68
33	9.69872	9.76111	.23889	9.93761	67
34	9.69946	9.76210	.23790	9.93737	66
35	9.70020	9.76308	.23692	9.93712	65
36	9.70093	9.76406	.23594	9.93687	64
37	9.70167	9.76504	.23496	9.93662	63
38	9.70240	9.76602	.23398	9.93638	62
39	9.70313	9.76700	.23300	9.93613	61
40	9.70386	9.76798	.23202	9.93588	60
41	9.70458	9.76896	.23104	9.93563	59
42	9.70531	9.76993	.23007	9.93538	58
43	9.70603	9.77091	.22909	9.93512	57
44	9.70675	9.77188	.22812	9.93487	56
45	9.70747	9.77285	.22715	9.93462	55
46	9.70819	9.77382	.22618	9.93437	54
47	9.70891	9.77479	.22521	9.93411	53
48	9.70962	9.77576	.22424	9.93386	52
49	9.71034	9.77673	.22327	9.93361	51
50	9.71105	9.77770	.22230	9.93335	50
	L. sin	L. tan	L. cot	L. cos	5300 2800
	L. cos	L. cot	L. tan	L. sin	4200 1000

Table 14. Five Place Logarithms of Functions of Angles in Mils—Continued
0500-3700 and 2100-5300—Continued

0500 3700	L. sin	L. tan	L. cot	L. sec	
2100 5300	L. cos	L. cot	L. tan	L. sin	
51	9.71176	9.77867	.22133	9.93309	49
52	9.71247	9.77963	.22037	9.93284	48
53	9.71318	9.78060	.21940	9.93258	47
54	9.71388	9.78156	.21844	9.93232	46
55	9.71459	9.78252	.21748	9.93206	45
56	9.71529	9.78348	.21652	9.93181	44
57	9.71599	9.78444	.21556	9.93155	43
58	9.71669	9.78540	.21460	9.93129	42
59	9.71739	9.78636	.21364	9.93103	41
60	9.71809	9.78732	.21268	9.93077	40
61	9.71878	9.78828	.21172	9.93050	39
62	9.71947	9.78923	.21077	9.93024	38
63	9.72017	9.79019	.20981	9.92998	37
64	9.72086	9.79114	.20886	9.92972	36
65	9.72154	9.79209	.20791	9.92945	35
66	9.72223	9.79304	.20696	9.92919	34
67	9.72292	9.79400	.20600	9.92892	33
68	9.72360	9.79495	.20505	9.92866	32
69	9.72429	9.79589	.20411	9.92839	31
70	9.72497	9.79684	.20316	9.92812	30
71	9.72565	9.79779	.20221	9.92786	29
72	9.72633	9.79874	.20126	9.92759	28
73	9.72700	9.79968	.20032	9.92732	27
74	9.72768	9.80063	.19937	9.92705	26
75	9.72835	9.80157	.19843	9.92678	25
76	9.72902	9.80251	.19749	9.92651	24
77	9.72970	9.80346	.19654	9.92624	23
78	9.73037	9.80440	.19560	9.92597	22
79	9.73103	9.80534	.19466	9.92570	21
80	9.73170	9.80628	.19372	9.92542	20
81	9.73237	9.80721	.19279	9.92515	19
82	9.73303	9.80815	.19185	9.92488	18
83	9.73369	9.80909	.19091	9.92460	17
84	9.73435	9.81003	.18997	9.92433	16
85	9.73501	9.81096	.18904	9.92406	15
86	9.73567	9.81189	.18811	9.92378	14
87	9.73633	9.81283	.18717	9.92350	13
88	9.73698	9.81376	.18624	9.92322	12
89	9.73764	9.81469	.18531	9.92294	11
90	9.73829	9.81562	.18438	9.92267	10
91	9.73894	9.81655	.18345	9.92239	09
92	9.73959	9.81748	.18252	9.92211	08
93	9.74024	9.81841	.18159	9.92183	07
94	9.74089	9.81934	.18066	9.92154	06
95	9.74153	9.82027	.17973	9.92126	05
96	9.74218	9.82119	.17881	9.92098	04
97	9.74282	9.82212	.17788	9.92070	03
98	9.74346	9.82305	.17696	9.92042	02
99	9.74410	9.82397	.17603	9.92013	01
100	9.74474	9.82489	.17511	9.91985	00
	L. sin	L. tan	L. cot	L. sec	5800
	L. cos	L. cot	L. tan	L. sin	2600
					4800
					1000

Table 14. Five Place Logarithms of Functions of Angles in Mils—Continued

0600-3800 and 2200-5400

0600 3800	L. sin	L. tan	L. cot	L. cos	
2200 5400	L. cos	L. cot	L. tan	L. sin	
00	9.74474	9.82489	.17511	9.91985	100
01	9.74538	9.82582	.17418	9.91956	99
02	9.74601	9.82674	.17326	9.91928	98
03	9.74665	9.82766	.17234	9.91899	97
04	9.74728	9.82858	.17142	9.91870	96
05	9.74791	9.82950	.17050	9.91841	95
06	9.74854	9.83042	.16958	9.91813	94
07	9.74917	9.83134	.16866	9.91784	93
08	9.74980	9.83225	.16775	9.91755	92
09	9.75043	9.83317	.16683	9.91726	91
10	9.75105	9.83409	.16591	9.91697	90
11	9.75168	9.83500	.16500	9.91668	89
12	9.75230	9.83592	.16408	9.91638	88
13	9.75292	9.83683	.16317	9.91609	87
14	9.75354	9.83774	.16226	9.91580	86
15	9.75416	9.83866	.16134	9.91550	85
16	9.75478	9.83957	.16043	9.91521	84
17	9.75539	9.84048	.15952	9.91492	83
18	9.75601	9.84139	.15861	9.91462	82
19	9.75662	9.84230	.15770	9.91432	81
20	9.75724	9.84321	.15679	9.91403	80
21	9.75785	9.84412	.15588	9.91373	79
22	9.75846	9.84503	.15497	9.91343	78
23	9.75906	9.84593	.15407	9.91313	77
24	9.75967	9.84684	.15316	9.91283	76
25	9.76028	9.84774	.15226	9.91253	75
26	9.76088	9.84865	.15135	9.91223	74
27	9.76149	9.84956	.15044	9.91193	73
28	9.76209	9.85046	.14954	9.91163	72
29	9.76269	9.85136	.14864	9.91133	71
30	9.76329	9.85227	.14773	9.91102	70
31	9.76389	9.85317	.14683	9.91072	69
32	9.76448	9.85407	.14593	9.91042	68
33	9.76508	9.85497	.14503	9.91011	67
34	9.76568	9.85587	.14413	9.90980	66
35	9.76627	9.85677	.14323	9.90950	65
36	9.76686	9.85767	.14233	9.90919	64
37	9.76745	9.85857	.14143	9.90888	63
38	9.76804	9.85947	.14053	9.90858	62
39	9.76863	9.86036	.13964	9.90827	61
40	9.76922	9.86126	.13874	9.90796	60
41	9.76980	9.86216	.13784	9.90765	59
42	9.77039	9.86305	.13695	9.90734	58
43	9.77097	9.86395	.13605	9.90703	57
44	9.77156	9.86484	.13516	9.90671	56
45	9.77214	9.86574	.13426	9.90640	55
46	9.77272	9.86663	.13337	9.90609	54
47	9.77330	9.86752	.13248	9.90577	53
48	9.77388	9.86842	.13158	9.90546	52
49	9.77445	9.86931	.13069	9.90514	51
50	9.77503	9.87020	.12980	9.90483	50
	L. sin	L. tan	L. cot	L. cos	5700 2500
	L. cos	L. cot	L. tan	L. sin	4100 0900

Table 14. Five Place Logarithms of Functions of Angles in Mils—Continued

0600-3800 and 2200-5400—Continued

0600 3800	L. sin	L. tan	L. cot	L. cos	
2200 5400	L. cos	L. cot	L. tan	L. sin	
51	9.77560	9.87109	.12891	9.90451	49
52	9.77617	9.87198	.12802	9.90419	48
53	9.77675	9.87287	.12713	9.90388	47
54	9.77732	9.87376	.12624	9.90356	46
55	9.77789	9.87465	.12535	9.90324	45
56	9.77846	9.87554	.12446	9.90292	44
57	9.77902	9.87642	.12358	9.90260	43
58	9.77959	9.87731	.12269	9.90228	42
59	9.78015	9.87820	.12180	9.90196	41
60	9.78072	9.87908	.12092	9.90163	40
61	9.78128	9.87997	.12003	9.90131	39
62	9.78184	9.88086	.11914	9.90099	38
63	9.78240	9.88174	.11826	9.90066	37
64	9.78296	9.88262	.11738	9.90034	36
65	9.78352	9.88351	.11649	9.90001	35
66	9.78408	9.88439	.11561	9.89968	34
67	9.78463	9.88527	.11473	9.89936	33
68	9.78519	9.88616	.11384	9.89903	32
69	9.78574	9.88704	.11296	9.89870	31
70	9.78629	9.88792	.11208	9.89837	30
71	9.78684	9.88880	.11120	9.89804	29
72	9.78739	9.88968	.11032	9.89771	28
73	9.78794	9.89056	.10944	9.89738	27
74	9.78849	9.89144	.10856	9.89705	26
75	9.78904	9.89232	.10768	9.89672	25
76	9.78958	9.89320	.10680	9.89638	24
77	9.79013	9.89408	.10592	9.89605	23
78	9.79067	9.89496	.10504	9.89572	22
79	9.79122	9.89583	.10417	9.89538	21
80	9.79176	9.89671	.10329	9.89504	20
81	9.79230	9.89759	.10241	9.89471	19
82	9.79284	9.89846	.10154	9.89437	18
83	9.79337	9.89934	.10066	9.89403	17
84	9.79391	9.90022	.09978	9.89370	16
85	9.79445	9.90109	.09891	9.89336	15
86	9.79498	9.90197	.09803	9.89302	14
87	9.79552	9.90284	.09716	9.89268	13
88	9.79605	9.90371	.09629	9.89233	12
89	9.79658	9.90459	.09541	9.89199	11
90	9.79711	9.90546	.09454	9.89165	10
91	9.79764	9.90633	.09367	9.89131	09
92	9.79817	9.90721	.09279	9.89096	08
93	9.79870	9.90808	.09192	9.89062	07
94	9.79922	9.90895	.09105	9.89027	06
95	9.79975	9.90982	.09018	9.88993	05
96	9.80027	9.91069	.08931	9.88958	04
97	9.80080	9.91156	.08844	9.88923	03
98	9.80132	9.91243	.08757	9.88888	02
99	9.80184	9.91330	.08670	9.88853	01
100	9.80236	9.91417	.08583	9.88819	00
	L. sin	L. tan	L. cot	L. cos	5700
	L. cos	L. cot	L. tan	L. sin	2300
					4100
					0900

Table 14. Five Place Logarithms of Functions of Angles in Mils—Continued

0700-3900 and 2300-5500

0700 3900	L. sin	L. tan	L. cot	L. cos	
2300 5500	L. cos	L. cot	L. tan	L. sin	
00	9.80236	9.91417	.08583	9.88819	100
01	9.80288	9.91504	.08496	9.88784	99
02	9.80340	9.91591	.08409	9.88748	98
03	9.80391	9.91678	.08322	9.88713	97
04	9.80443	9.91765	.08235	9.88678	96
05	8.80494	9.91852	.08148	9.88643	95
06	9.80546	9.91938	.08062	9.88607	94
07	9.80597	9.92025	.07975	9.88572	93
08	9.80648	9.92112	.07888	9.88536	92
09	9.80699	9.92198	.07802	9.88501	91
10	9.80750	9.92285	.07715	9.88465	90
11	9.80801	9.92372	.07628	9.88429	89
12	9.80852	9.92458	.07542	9.88394	88
13	9.80903	9.92545	.07455	9.88358	87
14	9.80953	9.92631	.07369	9.88322	86
15	9.81004	9.92718	.07282	9.88286	85
16	9.81054	9.92804	.07196	9.88250	84
17	9.81104	9.92891	.07109	9.88213	83
18	9.81154	9.92977	.07023	9.88177	82
19	9.81204	9.93064	.06936	9.88141	81
20	9.81254	9.93150	.06850	9.88105	80
21	9.81304	9.93236	.06764	9.88068	79
22	9.81354	9.93323	.06677	9.88032	78
23	9.81404	9.93409	.06591	9.87995	77
24	9.81453	9.93495	.06505	9.87958	76
25	9.81503	9.93581	.06419	9.87922	75
26	9.81552	9.93667	.06333	9.87885	74
27	9.81601	9.93754	.06246	9.87848	73
28	9.81651	9.93840	.06160	9.87811	72
29	9.81700	9.93926	.06074	9.87774	71
30	9.81749	9.94012	.05988	9.87737	70
31	9.81798	9.94098	.05902	9.87700	69
32	9.81846	9.94184	.05816	9.87662	68
33	9.81895	9.94270	.05730	9.87625	67
34	9.81944	9.94356	.05644	9.87588	66
35	9.81992	9.94442	.05558	9.87550	65
36	9.82041	9.94528	.05472	9.87513	64
37	9.82089	9.94614	.05386	9.87475	63
38	9.82137	9.94700	.05300	9.87437	62
39	9.82185	9.94786	.05214	9.87399	61
40	9.82233	9.94872	.05128	9.87362	60
41	9.82281	9.94958	.05042	9.87324	59
42	9.82329	9.95043	.04957	9.87286	58
43	9.82377	9.95129	.04871	9.87248	57
44	9.82424	9.95215	.04785	9.87209	56
45	9.82472	9.95301	.04699	9.87171	55
46	9.82520	9.95387	.04613	9.87133	54
47	9.82567	9.95472	.04528	9.87095	53
48	9.82614	9.95558	.04442	9.87056	52
49	9.82661	9.95644	.04356	9.87018	51
50	9.82708	9.95729	.04271	9.86979	50
	L. sin	L. tan	L. cot	L. cos	5800 2400
	L. cos	L. cot	L. tan	L. sin	4000 0800

Table 14. Five Place Logarithms of Function of Angles in Mils—Continued

0700-3900 and 2300-5500—Continued

0700 3900	L. sin	L. tan	L. cot	L. cos	
2300 5500	L. cos	L. cot	L. tan	L. sin	
51	9.82755	9.95815	.04185	9.86940	49
52	9.82802	9.95901	.04099	9.86902	48
53	9.82849	9.95986	.04014	9.86863	47
54	9.82896	9.96072	.03928	9.86824	46
55	9.82942	9.96158	.03842	9.86785	45
56	9.82989	9.96243	.03757	9.86746	44
57	9.83035	9.96329	.03671	9.86707	43
58	9.83082	9.96414	.03586	9.86667	42
59	9.83128	9.96500	.03500	9.86628	41
60	9.83174	9.96586	.03414	9.86589	40
61	9.83220	9.96671	.03329	9.86549	39
62	9.83266	9.96757	.03243	9.86510	38
63	9.83312	9.96842	.03158	9.86470	37
64	9.83358	9.96928	.03072	9.86430	36
65	9.83404	9.97013	.02987	9.86391	35
66	9.83449	9.97099	.02901	9.86351	34
67	9.83495	9.97184	.02816	9.86311	33
68	9.83540	9.97269	.02731	9.86271	32
69	9.83586	9.97355	.02645	9.86231	31
70	9.83631	9.97440	.02560	9.86191	30
71	9.83676	9.97526	.02474	9.86150	29
72	9.83721	9.97611	.02389	9.86110	28
73	9.83766	9.97697	.02303	9.86070	27
74	9.83811	9.97782	.02218	9.86029	26
75	9.83856	9.97867	.02133	9.85989	25
76	9.83901	9.97953	.02047	9.85948	24
77	9.83945	9.98038	.01962	9.85907	23
78	9.83990	9.98123	.01877	9.85867	22
79	9.84034	9.98209	.01791	9.85826	21
80	9.84079	9.98294	.01706	9.85785	20
81	9.84123	9.98379	.01621	9.85744	19
82	9.84167	9.98465	.01535	9.85703	18
83	9.84211	9.98550	.01450	9.85661	17
84	9.84255	9.98635	.01365	9.85620	16
85	9.84299	9.98721	.01279	9.85579	15
86	9.84343	9.98806	.01194	9.85537	14
87	9.84387	9.98891	.01109	9.85496	13
88	9.84431	9.98977	.01023	9.85454	12
89	9.84474	9.99062	.00938	9.85412	11
90	9.84518	9.99147	.00853	9.85371	10
91	9.84561	9.99232	.00768	9.85329	09
92	9.84605	9.99318	.00682	9.85287	08
93	9.84648	9.99403	.00597	9.85245	07
94	9.84691	9.99488	.00512	9.85203	06
95	9.84734	9.99574	.00426	9.85161	05
96	9.84777	9.99659	.00341	9.85118	04
97	9.84820	9.99744	.00256	9.85076	03
98	9.84863	9.99829	.00171	9.85034	02
99	9.84906	9.99915	.00085	9.84991	01
100	9.84948	0.00000	.00000	9.84948	00
	L. sin	L. tan	L. cot	L. cos	5600
	L. cos	L. cot	L. tan	L. sin	2400
					4000
					0800

TABLE 15
ZONE TO ZONE AZIMUTH TRANSFORMATION TABLE

EXPLANATION

This table was computed and printed by the gun direction computer M-18 (FADAC). The change in azimuth (C) of a known line of direction can be determined when transforming coordinates from one UTM grid zone to an adjacent zone.

The change in azimuth (C) has been tabulated for each 10,000 meters of northing (N).

The coordinates must first be transformed to the adjacent zone. The northing coordinates in each zone are added and then divided by 2 to determine the average northing, which is used as the argument to enter the table.

Example: (Fifth order accuracy):

Required: Change in azimuth (C) to the nearest 0.1 μ . The average northing is 3,832,123. The table is entered using the northing rounded to the nearest 1,000 meters (3832000). It lies between the tabulated values below:

<u>N</u>	<u>C</u>	
3830000	60.573	
3840000	60.711	diff = 0.138

The argument is .2 of the way between 3,830,000 and 3,840,000. Therefore, multiply .2 x 0.138 (total difference) = 0.0276. This is rounded to 0.028 and is added to the value given for 3,830,000:

$$\begin{array}{r} 60.573 \\ +0.028 \\ \hline 60.601 \end{array}$$

Rounded to the nearest 0.1 μ , the result is 60.6 μ .

Example: (Fourth order accuracy):

Required: Change in azimuth (C) to the nearest 0.001 μ . The average northing is 3,832,723. The table is entered using the northing rounded to the nearest 100 meters (3832700). It lies between the tabulated values below:

<u>N</u>	<u>C</u>	
3,830,000	60.573	
3,840,000	60.711	diff = 0.138

The argument is .27 of the way between 3,830,000 and 3,840,000. Therefore, multiply .27 x 0.138 (total difference) = 0.03726, which is rounded to 0.037. This value is added to the value opposite 3,830,000:

$$\begin{array}{r} 60.573 \\ +0.037 \\ \hline 60.610 \end{array}$$

The sign of the change in azimuth is determined by use of the following chart:

When the point is transformed from:

(Northern Hemisphere)

East to West, sign is -

West to East, sign is +

(Southern Hemisphere)*

East to West, sign is +

West to East, sign is -

*When in the Southern Hemisphere, the average northing coordinate must be subtracted from 10,000,000 before entering the table.

N	C	N	C	N	C
0	.000	500000	8.410	1000000	16.766
10000	.168	510000	8.578	1010000	16.933
20000	.336	520000	8.746	1020000	17.099
30000	.505	530000	8.913	1030000	17.265
40000	.673	540000	9.081	1040000	17.431
50000	.841	550000	9.248	1050000	17.597
60000	1.009	560000	9.416	1060000	17.763
70000	1.177	570000	9.584	1070000	17.929
80000	1.347	580000	9.752	1080000	18.095
90000	1.515	590000	9.919	1090000	18.261
100000	1.683	600000	10.087	1100000	18.426
110000	1.851	610000	10.254	1110000	18.593
120000	2.019	620000	10.422	1120000	18.759
130000	2.188	630000	10.590	1130000	18.924
140000	2.357	640000	10.758	1140000	19.090
150000	2.525	650000	10.925	1150000	19.255
160000	2.693	660000	11.092	1160000	19.421
170000	2.861	670000	11.259	1170000	19.586
180000	3.030	680000	11.427	1180000	19.751
190000	3.198	690000	11.594	1190000	19.917
200000	3.366	700000	11.762	1200000	20.083
210000	3.535	710000	11.929	1210000	20.248
220000	3.704	720000	12.096	1220000	20.413
230000	3.872	730000	12.263	1230000	20.578
240000	4.040	740000	12.431	1240000	20.743
250000	4.208	750000	12.598	1250000	20.908
260000	4.376	760000	12.765	1260000	21.073
270000	4.545	770000	12.933	1270000	21.238
280000	4.713	780000	13.100	1280000	21.403
290000	4.881	790000	13.266	1290000	21.568
300000	5.049	800000	13.433	1300000	21.733
310000	5.217	810000	13.600	1310000	21.898
320000	5.386	820000	13.767	1320000	22.062
330000	5.554	830000	13.934	1330000	22.227
340000	5.722	840000	14.102	1340000	22.391
350000	5.890	850000	14.268	1350000	22.556
360000	6.058	860000	14.435	1360000	22.720
370000	6.227	870000	14.602	1370000	22.885
380000	6.395	880000	14.768	1380000	23.049
390000	6.563	890000	14.936	1390000	23.213
400000	6.731	900000	15.102	1400000	23.377
410000	6.898	910000	15.269	1410000	23.541
420000	7.066	920000	15.435	1420000	23.705
430000	7.235	930000	15.602	1430000	23.869
440000	7.403	940000	15.768	1440000	24.033
450000	7.571	950000	15.935	1450000	24.197
460000	7.738	960000	16.102	1460000	24.361
470000	7.906	970000	16.268	1470000	24.525
480000	8.074	980000	16.434	1480000	24.688
490000	8.242	990000	16.600	1490000	24.853

LATITUDES 0° TO 13° 5

N	C	N	C	N	C
1500000	25.016	2000000	33.108	2500000	40.990
1510000	25.180	2010000	33.268	2510000	41.145
1520000	25.343	2020000	33.428	2520000	41.301
1530000	25.507	2030000	33.587	2530000	41.456
1540000	25.670	2040000	33.747	2540000	41.611
1550000	25.833	2050000	33.907	2550000	41.765
1560000	25.996	2060000	34.066	2560000	41.320
1570000	26.159	2070000	34.225	2570000	42.075
1580000	26.322	2080000	34.385	2580000	42.229
1590000	26.485	2090000	34.544	2590000	42.384
1600000	26.648	2100000	34.703	2600000	42.538
1610000	26.811	2110000	34.862	2610000	42.692
1620000	26.974	2120000	35.021	2620000	42.846
1630000	27.137	2130000	35.180	2630000	42.999
1640000	27.299	2140000	35.338	2640000	43.153
1650000	27.462	2150000	35.497	2650000	43.307
1660000	27.625	2160000	35.656	2660000	43.461
1670000	27.788	2170000	35.814	2670000	43.614
1680000	27.950	2180000	35.973	2680000	43.768
1690000	28.112	2190000	36.131	2690000	43.921
1700000	28.275	2200000	36.289	2700000	44.074
1710000	28.437	2210000	36.447	2710000	44.227
1720000	28.599	2220000	36.604	2720000	44.380
1730000	28.761	2230000	36.762	2730000	44.533
1740000	28.923	2240000	36.920	2740000	44.686
1750000	29.085	2250000	37.078	2750000	44.838
1760000	29.248	2260000	37.236	2760000	44.990
1770000	29.409	2270000	37.393	2770000	45.143
1780000	29.571	2280000	37.551	2780000	45.295
1790000	29.733	2290000	37.708	2790000	45.447
1800000	29.894	2300000	37.865	2800000	45.600
1810000	30.055	2310000	38.023	2810000	45.752
1820000	30.217	2320000	38.180	2820000	45.903
1830000	30.378	2330000	38.337	2830000	46.055
1840000	30.539	2340000	38.494	2840000	46.206
1850000	30.700	2350000	38.650	2850000	46.357
1860000	30.862	2360000	38.807	2860000	46.509
1870000	31.022	2370000	38.964	2870000	46.660
1880000	31.183	2380000	39.120	2880000	46.811
1890000	31.344	2390000	39.277	2890000	46.962
1900000	31.505	2400000	39.433	2900000	47.113
1910000	31.666	2410000	39.589	2910000	47.263
1920000	31.826	2420000	39.746	2920000	47.414
1930000	31.987	2430000	39.902	2930000	47.565
1940000	32.147	2440000	40.058	2940000	47.714
1950000	32.308	2450000	40.213	2950000	47.865
1960000	32.468	2460000	40.369	2960000	48.015
1970000	32.628	2470000	40.524	2970000	48.165
1980000	32.788	2480000	40.679	2980000	48.315
1990000	32.948	2490000	40.835	2990000	48.465

LATITUDES 13° 5 TO 27°

N	C	N	C	N	C
3000000	48.614	3500000	55.931	4000000	62.900
2010000	48.763	3510000	56.075	4010000	63.034
3020000	48.913	3520000	56.218	4020000	63.170
3030000	49.062	3530000	56.361	4030000	63.305
3040000	49.212	3540000	56.503	4040000	63.440
3050000	49.360	3550000	56.645	4050000	63.575
3060000	49.509	3560000	56.787	4060000	63.710
3070000	49.658	3570000	56.930	4070000	63.844
3080000	49.807	3580000	57.072	4080000	63.978
3090000	49.955	3590000	57.214	4090000	64.113
3100000	50.104	3600000	57.355	4100000	64.247
3110000	50.251	3610000	57.496	4110000	64.381
3120000	50.400	3620000	57.638	4120000	64.514
3130000	50.548	3630000	57.780	4130000	64.648
3140000	50.696	3640000	57.921	4140000	64.782
3150000	50.844	3650000	58.061	4150000	64.914
3160000	50.991	3660000	58.202	4160000	65.048
3170000	51.138	3670000	58.343	4170000	65.181
3180000	51.286	3680000	58.484	4180000	65.313
3190000	51.433	3690000	58.623	4190000	65.446
3200000	51.581	3700000	58.764	4200000	65.579
3210000	51.727	3710000	58.904	4210000	65.710
3220000	51.874	3720000	59.044	4220000	65.843
3230000	52.021	3730000	59.184	4230000	65.975
3240000	52.168	3740000	59.323	4240000	66.106
3250000	52.313	3750000	59.463	4250000	66.238
3260000	52.460	3760000	59.602	4260000	66.369
3270000	52.606	3770000	59.742	4270000	66.500
3280000	52.752	3780000	59.880	4280000	66.631
3290000	52.899	3790000	60.019	4290000	66.762
3300000	53.044	3800000	60.158	4300000	66.893
3310000	53.189	3810000	60.297	4310000	67.024
3320000	53.335	3820000	60.435	4320000	67.153
3330000	53.481	3830000	60.573	4330000	67.284
3340000	53.626	3840000	60.711	4340000	67.413
3350000	53.771	3850000	60.849	4350000	67.544
3360000	53.916	3860000	60.987	4360000	67.674
3370000	54.061	3870000	61.125	4370000	67.803
3380000	54.206	3880000	61.261	4380000	67.932
3390000	54.351	3890000	61.399	4390000	68.062
3400000	54.494	3900000	61.536	4400000	68.190
3410000	54.639	3910000	61.673	4410000	68.320
3420000	54.783	3920000	61.810	4420000	68.449
3430000	54.927	3930000	61.947	4430000	68.577
3440000	55.072	3940000	62.083	4440000	68.705
3450000	55.216	3950000	62.219	4450000	68.834
3460000	55.358	3960000	62.356	4460000	68.961
3470000	55.502	3970000	62.491	4470000	69.089
3480000	55.646	3980000	62.628	4480000	69.217
3490000	55.789	3990000	62.764	4490000	69.344

LATITUDES 27° TO 40°.5

N	C	N	C	N	C
4500000	69.472	5000000	75.612	5500000	81.281
4510000	69.598	5010000	75.730	5510000	81.390
4520000	69.726	5020000	75.848	5520000	81.498
4530000	69.853	5030000	75.966	5530000	81.606
4540000	69.979	5040000	76.083	5540000	81.714
4550000	70.106	5050000	76.201	5550000	81.821
4560000	70.232	5060000	76.319	5560000	81.928
4570000	70.358	5070000	76.435	5570000	82.036
4580000	70.484	5080000	76.552	5580000	82.142
4590000	70.610	5090000	76.669	5590000	82.249
4600000	70.735	5100000	76.785	5600000	82.355
4610000	70.861	5110000	76.901	5610000	82.462
4620000	70.987	5120000	77.017	5620000	82.568
4630000	71.111	5130000	77.133	5630000	82.673
4640000	71.236	5140000	77.249	5640000	82.779
4650000	71.361	5150000	77.364	5650000	82.885
4660000	71.485	5160000	77.479	5660000	82.990
4670000	71.610	5170000	77.595	5670000	83.095
4680000	71.734	5180000	77.709	5680000	83.200
4690000	71.858	5190000	77.824	5690000	83.305
4700000	71.982	5200000	77.939	5700000	83.409
4710000	72.106	5210000	78.053	5710000	83.513
4720000	72.229	5220000	78.167	5720000	83.617
4730000	72.352	5230000	78.281	5730000	83.722
4740000	72.475	5240000	78.394	5740000	83.825
4750000	72.598	5250000	78.508	5750000	83.928
4760000	72.721	5260000	78.622	5760000	84.032
4770000	72.843	5270000	78.734	5770000	84.134
4780000	72.966	5280000	78.848	5780000	84.237
4790000	73.088	5290000	78.960	5790000	84.340
4800000	73.210	5300000	79.073	5800000	84.442
4810000	73.332	5310000	79.185	5810000	84.545
4820000	73.454	5320000	79.297	5820000	84.647
4830000	73.575	5330000	79.409	5830000	84.748
4840000	73.696	5340000	79.521	5840000	84.850
4850000	73.818	5350000	79.632	5850000	84.952
4860000	73.938	5360000	79.744	5860000	85.052
4870000	74.059	5370000	79.854	5870000	85.153
4880000	74.180	5380000	79.966	5880000	85.254
4890000	74.300	5390000	80.076	5890000	85.354
4900000	74.420	5400000	80.187	5900000	85.455
4910000	74.541	5410000	80.298	5910000	85.555
4920000	74.660	5420000	80.407	5920000	85.654
4930000	74.780	5430000	80.517	5930000	85.754
4940000	74.900	5440000	80.627	5940000	85.854
4950000	75.018	5450000	80.736	5950000	85.953
4960000	75.138	5460000	80.846	5960000	86.052
4970000	75.257	5470000	80.955	5970000	86.151
4980000	75.375	5480000	81.064	5980000	86.249
4990000	75.494	5490000	81.173	5990000	86.348

LATITUDES 40°.5 TO 54°

N	C	N	C	N	C
6000000	86.445	6500000	91.075	7000000	95.143
6010000	86.543	6510000	91.162	7010000	95.218
6020000	86.640	6520000	91.249	7020000	95.293
6030000	86.738	6530000	91.335	7030000	95.368
6040000	86.836	6540000	91.421	7040000	95.443
6050000	86.932	6550000	91.507	7050000	95.517
6060000	87.029	6560000	91.592	7060000	95.592
6070000	87.126	6570000	91.678	7070000	95.666
6080000	87.223	6580000	91.764	7080000	95.739
6090000	87.319	6590000	91.849	7090000	95.813
6100000	87.415	6600000	91.933	7100000	95.886
6110000	87.511	6610000	92.018	7110000	95.959
6120000	87.606	6620000	92.103	7120000	96.032
6130000	87.702	6630000	92.188	7130000	96.105
6140000	87.797	6640000	92.271	7140000	96.178
6150000	87.891	6650000	92.355	7150000	96.250
6160000	87.986	6660000	92.439	7160000	96.321
6170000	88.081	6670000	92.522	7170000	96.393
6180000	88.176	6680000	92.604	7180000	96.464
6190000	88.269	6690000	92.688	7190000	96.536
6200000	88.363	6700000	92.770	7200000	96.607
6210000	88.457	6710000	92.853	7210000	96.677
6220000	88.550	6720000	92.934	7220000	96.748
6230000	88.643	6730000	93.017	7230000	96.818
6240000	88.736	6740000	93.098	7240000	96.888
6250000	88.829	6750000	93.180	7250000	96.958
6260000	88.921	6760000	93.262	7260000	97.028
6270000	89.014	6770000	93.342	7270000	97.096
6280000	89.106	6780000	93.423	7280000	97.166
6290000	89.198	6790000	93.504	7290000	97.234
6300000	89.289	6800000	93.584	7300000	97.303
6310000	89.381	6810000	93.665	7310000	97.371
6320000	89.472	6820000	93.745	7320000	97.440
6330000	89.564	6830000	93.824	7330000	97.508
6340000	89.654	6840000	93.903	7340000	97.575
6350000	89.745	6850000	93.982	7350000	97.643
6360000	89.835	6860000	94.062	7360000	97.710
6370000	89.924	6870000	94.140	7370000	97.776
6380000	90.015	6880000	94.219	7380000	97.843
6390000	90.105	6890000	94.298	7390000	97.909
6400000	90.193	6900000	94.375	7400000	97.975
6410000	90.283	6910000	94.453	7410000	98.041
6420000	90.372	6920000	94.530	7420000	98.107
6430000	90.460	6930000	94.608	7430000	98.173
6440000	90.549	6940000	94.685	7440000	98.238
6450000	90.637	6950000	94.762	7450000	98.303
6460000	90.725	6960000	94.838	7460000	98.368
6470000	90.813	6970000	94.915	7470000	98.432
6480000	90.901	6980000	94.991	7480000	98.496
6490000	90.988	6990000	95.067	7490000	98.560

LATITUDES 54° TO 67° 5

N	C	N	C	N	C
7500000	98.624	8000000	101.500	8500000	103.754
7510000	98.688	8010000	101.551	8510000	103.792
7520000	98.751	8020000	101.602	8520000	103.830
7530000	98.814	8030000	101.652	8530000	103.869
7540000	98.877	8040000	101.703	8540000	103.906
7550000	98.939	8050000	101.753	8550000	103.944
7560000	99.002	8060000	101.803	8560000	103.982
7570000	99.064	8070000	101.853	8570000	104.018
7580000	99.126	8080000	101.903	8580000	104.055
7590000	99.187	8090000	101.952	8590000	104.092
7600000	99.248	8100000	102.000	8600000	104.128
7610000	99.309	8110000	102.050	8610000	104.164
7620000	99.370	8120000	102.098	8620000	104.200
7630000	99.431	8130000	102.146	8630000	104.255
7640000	99.491	8140000	102.194	8640000	104.270
7650000	99.551	8150000	102.243	8650000	104.306
7660000	99.661	8160000	102.290	8660000	104.340
7670000	99.671	8170000	102.337	8670000	104.374
7680000	99.730	8180000	102.384	8680000	104.408
7690000	99.789	8190000	102.430	8690000	104.443
7700000	99.848	8200000	102.477	8700000	104.476
7710000	99.907	8210000	102.523	8710000	104.509
7720000	99.965	8220000	102.569	8720000	104.543
7730000	100.024	8230000	102.615	8730000	104.576
7740000	100.082	8240000	102.660	8740000	104.608
7750000	100.139	8250000	102.706	8750000	104.641
7760000	100.195	8260000	102.750	8760000	104.673
7770000	100.254	8270000	102.795	8770000	104.705
7780000	100.311	8280000	102.839	8780000	104.737
7790000	100.367	8290000	102.884	8790000	104.768
7800000	100.424	8300000	102.928	8800000	104.800
7810000	100.480	8310000	102.971	8810000	104.830
7820000	100.536	8320000	103.014	8820000	104.861
7830000	100.591	8330000	103.058	8830000	104.891
7840000	100.647	8340000	103.101	8840000	104.922
7850000	100.703	8350000	103.143	8850000	104.952
7860000	100.757	8360000	103.186	8860000	104.982
7870000	100.811	8370000	103.228	8870000	105.011
7880000	100.865	8380000	103.270	8880000	105.040
7890000	100.920	8390000	103.311	8890000	105.069
7900000	100.973	8400000	103.353	8900000	105.098
7910000	101.027	8410000	103.394	8910000	105.126
7920000	101.081	8420000	103.435	8920000	105.154
7930000	101.134	8430000	103.475	8930000	105.182
7940000	101.187	8440000	103.516	8940000	105.210
7950000	101.240	8450000	103.556	8950000	105.237
7960000	101.292	8460000	103.596	8960000	105.264
7970000	101.344	8470000	103.636	8970000	105.291
7980000	101.396	8480000	103.675	8980000	105.318
7990000	101.448	8490000	103.714	8990000	105.344

LATITUDES 67°.5 TO 81°

N	C
9000000	105.370
9010000	105.395
9020000	105.420
9030000	105.446
9040000	105.471
9050000	105.496
9060000	105.520
9070000	105.544
9080000	105.569
9090000	105.592
9100000	105.616
9110000	105.639
9120000	105.662
9130000	105.685
9140000	105.708
9150000	105.730
9160000	105.752
9170000	105.774
9180000	105.796
9190000	105.817
9200000	105.839
9210000	105.860
9220000	105.880
9230000	105.901
9240000	105.920
9250000	105.940
9260000	105.960
9270000	105.979
9280000	105.998
9290000	106.017
9300000	106.036

LATITUDES 81° TO 84°



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General, United States Army
Vice Chief of Staff

Official:

VERNE L. BOWERS
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